

DESCRIPTION

THERMOPLASTIC RESIN COMPOSITION AND MOLDED ARTICLE

5 TECHNICAL FIELD

The present invention relates to a thermoplastic resin composition having excellent impact resistance, chemical resistance, surface appearance of molded articles and antistatic property or charge controlling
10 property, and also relates to a molded article made from such a thermoplastic resin composition.

Styrene resins such as ABS resins are excellent in impact resistance, moldability and mechanical strength
15 such as rigidity as well as surface appearance of molded articles, and are thus widely used in the fields of electrics/electronics, office automation/household electric appliance, automobiles, sanitation and the like. However, depending on applications, chemical resistance
20 may not be sufficient, and thus there is a need for further improvement in chemical resistance.

On the other hand, olefin resins such as polypropylene are excellent in chemical resistance, heat resistance, flowability and the like. Thus, similarly to
25 styrene resins, olefin resins are also widely used in the fields of electrics/electronics, office automation/household electric appliance, automobiles,

sanitation and the like. However, olefin resins are problematic in that impact resistance is low, and warping and sink marks easily occur in the molded article. In addition, olefin resins are also problematic in that
5 physical properties, dimension and the like easily change after molding.

It could be considered to blend an ABS resin with a polypropylene for the purpose of improving on the above problems. However, the two materials are poor in
10 compatibility, and thus provide a very brittle material when they are simply melt-kneaded. Patent Document 1 suggests that a polystyrene resin and a polypropylene resin be blended in the presence of a styrene-butadiene block copolymer rubber, but is silent as to examples in
15 which an ABS resin, AS resin or the like is mixed with polypropylene. Patent Document 2 suggests that a polyolefin resin and a polystyrene resin be blended together with a hydrogenated styrene-butadiene block copolymer, but is silent as to examples in which an ABS
20 resin, AS resin or the like is mixed with a polyolefin resin. Patent Document 3 suggests a composition consisting of a polyolefin resin, a low molecular weight polystyrene and a styrene-butadiene block copolymer, but does not disclose any example of a blend with an ABS
25 resin, AS resin or the like.

Patent Document 4 suggests that an epoxy-modified polypropylene and a styrene resin modified with an

unsaturated carboxylic acid or anhydride be used as compatibilizing agents. Patent Document 5 suggests that a polypropylene resin modified with an epoxy group and a styrene-butadiene-styrene block copolymer modified with an unsaturated carboxylic acid or anhydride thereof be used. However, they are insufficient in impact resistance and surface appearance of molded articles. Furthermore, the molded articles are easy to be electrostatically charged, and thus difficult to use in applications where electrostatic damage is caused by the articles.

In addition, styrene resins such as ABS resins and olefin resins such as polypropylene are both susceptible to be electrostatically charged, and thus they are difficult to use in articles susceptible to be damaged by static electricity, for instance liquid crystal display devices, plasma displays, peripheral parts of semiconductors, or various parts, sheets, films and the like that are used or handled in clean rooms and the like.

For the purpose of improving such drawbacks, Patent Document 9 suggests that a polyamide elastomer is blended with a styrene resin such as an ABS resin, but it is problematic in that antistatic property was not sufficiently expressed. Similarly, Patent Documents 10 and 11 suggest compositions which comprise rubber-reinforced styrene resins and polyamide elastomers. Further, Patent Documents 6 and 7 suggest that specific

antistatic agents are blended with polyolefin resins, but they are problematic in that antistatic property is not sustained or insufficient. As a method for sustaining antistatic property, Patent Documents 8 and 12 suggest
5 that a block copolymer comprising a polyolefin block and a hydrophilic polymer block such as polyether be blended with polyolefin resins, but they are problematic in that antistatic property is not sufficiently expressed.

- Patent Document 1: Japanese Patent Publication
10 (Kokoku) No. S52-17055
- Patent Document 2: Japanese Patent Laid-Open (Kokai)
No. S56-38338
- Patent Document 3: Japanese Patent Laid-Open (Kokai)
No. S56-104978
- 15 Patent Document 4: Japanese Patent Laid-Open (Kokai)
No. H01-174550
- Patent Document 5: Japanese Patent Laid-Open (Kokai)
No. H04-266953
- Patent Document 6: Japanese Patent Laid-Open (Kokai)
20 No. H04-258647
- Patent Document 7: Japanese Patent Laid-Open (Kokai)
No. 2000-313875
- Patent Document 8: Japanese Patent Laid-Open (Kokai)
No. 2001-278985
- 25 Patent Document 9: Japanese Patent Laid-Open (Kokai)
No. S60-23435

Patent Document 10: Japanese Patent Laid-Open
(Kokai) No. H04-309547

Patent Document 11: Japanese Patent Laid-Open
(Kokai) No. H02-292353

5 Patent Document 12: Japanese Patent Laid-Open
(Kokai) No. 2002-284880

DISCLOSURE OF THE INVENTION

PROBLEMS THAT IS TO BE SOLVED BY THE INVENTION

10 It is an object of the present invention to provide
a thermoplastic resin composition having excellent impact
resistance, chemical resistance, surface appearance of
molded articles and antistatic property or charge
controlling property, and a molded article made of such
15 thermoplastic resin composition.

MEANS THAT SOLVE THE PROBLEMS

As a result of extensive studies to achieve the
above objects, the present inventors have arrived at the
20 present invention by way of the finding that a molded
article excellent in impact resistance, chemical
resistance, surface appearance of molded articles and
antistatic property can be obtained by mixing a block
copolymer comprising an olefin polymer block and a
25 hydrophilic polymer block with a thermoplastic resin
composition comprising a styrene resin and/or olefin
resin. In addition, the present inventors have arrived

at the present invention by way of the finding that the properties such as impact resistance, antistatic property and the like can be improved by further mixing a specific antistatic compound and/or a polymer having a specific
5 block structure or a modified product of a low molecular weight polyolefin.

That is, according to one aspect of the present invention, there is provided a thermoplastic resin composition (hereinafter referred to as "the first
10 thermoplastic resin composition") characterized in that it comprises 5 to 100% by mass of the following Component (A) and 95 to 0% by mass of the following Component (B) (with the total of Component (A) and Component (B) being 100% by mass), and further comprises 0.5 to 100 parts by
15 mass of the following Component (C1) per 100 parts by mass of the total of Component (A) and Component (B), wherein

Component (A): a styrene resin resulting from (co)polymerization of an aromatic vinyl compound, or an
20 aromatic vinyl compound and another vinyl monomer copolymerizable with the aromatic vinyl compound in a presence or absence of a rubber-like polymer,;

Component (B): an olefin resin; and

Component (C1): a block copolymer comprising an
25 olefin polymer block (c1-1) and a hydrophilic polymer block (c1-2).

Further, according to a preferred embodiment of the present invention, there is provided the first thermoplastic resin composition which further comprises at least one component selected from the group consisting of the following Components (C2-1), (C2-2), (C2-3) and (C2-4) in an amount of 0.001 to 60 parts by mass per 100 parts by mass of the total of Component (A) and Component (B), wherein

Component (C2-1): a polyetherpolyamide and/or polyetherpolyester;

Component (C2-2): a nonionic antistatic agent;

Component (C2-3): a boron compound; and

Component (C2-4): a lithium salt.

Further, according to another preferred embodiment of the present invention, there is provided the first thermoplastic resin composition which further comprises at least one component selected from the group consisting of the following Components (D), (E), (F), and (G) in an amount of 1 to 200 parts by mass per 100 parts by mass of the total of Component (A) and Component (B), wherein

Component (D): at least one polymer selected from the group consisting of a block copolymer (D-a) comprising a polymer block (d-1) mainly consisting of an aromatic vinyl compound and a polymer block (d-2) mainly consisting of a conjugated diene compound, and a hydrogenated product (D-b) thereof;

Component (E): a graft polymer resulting from (co)polymerization of an aromatic vinyl compound, or an aromatic vinyl compound and another vinyl monomer copolymerizable with the aromatic vinyl compound in a presence of the Component (D);

Component (F): an aromatic polycarbonate block copolymer comprising a polymer block (f-1) consisting of the Component (D), and an aromatic carbonate polymer block (f-2); and

Component (G): a low molecular weight polyolefin modified with an unsaturated acid and/or unsaturated acid anhydride.

In the first thermoplastic resin composition, the at least one component selected from the group consisting of Component (D), Component (E), Component (F), and Component (G) may be used together with at least one component selected from the group consisting of Component (C2-1), Component (C2-2), Component (C2-3) and Component (C2-4).

Further, according to another preferred embodiment of the present invention, the first thermoplastic resin composition comprises 5 to 95% by mass of Component (A) and 95 to 5% by mass of Component (B) (with the total of Component (A) and Component (B) being 100% by mass).

Further, according to another aspect of the present invention, there is provided a thermoplastic resin composition (hereinafter referred to as "the second

thermoplastic resin composition") characterized in that it comprises 70 to 97% by mass of the following Component (B) and 30 to 3% by mass of the following Component (C1) (with the total of Component (B) and Component (C1) being 100% by mass), and further comprises 0.01 to 10 parts by mass of the following Component (C2-2) per 100 parts by mass of the total of Components (B) and (C1), wherein

Component (B): an olefin resin;

Component (C1): a block copolymer comprising an olefin polymer block (c1-1) and a hydrophilic polymer block (c1-2); and

Component (C2-2): a nonionic antistatic agent.

The second thermoplastic resin composition may further comprise at least one component selected from the group consisting of the above Components (C2-1), (C2-3) and (C2-4) in an amount of 0.001 to 60 parts by mass per 100 parts by mass of Component (B).

Further, according to another aspect of the present invention, there is provided a thermoplastic resin composition (hereinafter referred to as "the third thermoplastic resin composition") characterized in that it comprises 30 to 96% by mass of the following Component (B), 3 to 30% by mass of the following Component (C1), and 1 to 40% by mass of the following Component (D) (with the total of Component (B), Component (C1) and Component (D) being 100% by mass), and further comprises 0.01 to 10 parts by mass of the following Component (C2-2) per 100

parts by mass of the total of Component (B), Component (C1) and Component (D), wherein

Component (B): an olefin resin;

Component (C1): a block copolymer comprising an
5 olefin polymer block (c1-1) and a hydrophilic polymer block (c1-2);

Component (D): at least one polymer selected from the group consisting of a block copolymer (D-a) comprising a polymer block (d-1) mainly consisting of an
10 aromatic vinyl compound and a polymer block (d-2) mainly consisting of a conjugated diene compound, and a hydrogenated product (D-b) thereof; and

Component (C2-2): a nonionic antistatic agent.

The third thermoplastic resin composition may
15 further comprise at least one component selected from the group consisting of the above Components (C2-1), (C2-3) and (C2-4) in an amount of 0.001 to 60 parts by mass per 100 parts by mass of Component (B).

The second and third thermoplastic resin
20 compositions can each be used as a molding material as they are, and can also be used as a raw material for producing the first thermoplastic resin composition.

Further, according to another aspect of the present invention, there is provided a molded article formed of
25 at least one of the first to third thermoplastic resin compositions. This molded article may be a sheet or a film.

Thus, according to another aspect of the present invention, there is provided a multilayer molded article comprising a substrate to which a sheet or film formed of at least one of the first to third thermoplastic resin compositions is laminated onto at least one surface thereof. According to a preferred embodiment, the substrate is a sheet or film formed of an olefin resin.

EFFECTS OF THE INVENTION

10 The thermoplastic resin composition according to the present invention is a thermoplastic resin composition comprising the styrene resin of Component (A) and/or the olefin resin of Component (B), with which are blended the block copolymer of Component (C1) and, as desired, a
15 specific antistatic compound and/or a polymer having a specific block structure or a modified product of a low molecular weight polyolefin. Thus, it provides molded articles excellent in impact resistance, chemical resistance, surface appearance of molded articles and
20 antistatic property or charge controlling property.

BEST MODE FOR CARRYING OUT THE INVENTION

 The present invention will now be explained in more detail. In the present specification, the term
25 "(co)polymerization" means homopolymerization and/or copolymerization; the term "(meth)acryl" means acryl

and/or methacryl; and the term "(meth)acrylate" means acrylate and/or methacrylate.

(1) Component (A)

The styrene resin (A) according to the present invention is a polymer obtained by (co)polymerization of, in the presence or absence of a rubber-like polymer (a), a vinyl monomer (b) which comprises an aromatic vinyl compound or an aromatic vinyl compound and another vinyl monomer copolymerizable with the aromatic vinyl compound.

From the viewpoint of impact resistance, the styrene resin (A) preferably comprises at least one kind of polymer obtained by graft (co)polymerization in the presence of the rubber-like polymer (a). Content of the rubber-like polymer (a) is preferably 3 to 80% by mass, more preferably 5 to 70% by mass, and especially preferably 10 to 60% by mass based on 100% by mass of the styrene resin (A).

The rubber-like polymer (a) includes, but is not limited to, polybutadienes, butadiene-styrene copolymers, butadiene-acrylonitrile copolymers, ethylene-propylene copolymers, ethylene-propylene-non-conjugated diene copolymers, ethylene-butene-1 copolymers, ethylene-butene-1-non-conjugated diene copolymers, acrylic rubbers, silicone rubbers, silicone-acryl IPN rubbers and the like.

These can be used alone or in combination of two or more.

Of these, polybutadienes, butadiene-styrene copolymers, ethylene-propylene copolymers, ethylene-

propylene-non-conjugated diene copolymers, acrylic rubbers and silicone rubbers are preferable. The butadiene-styrene copolymer used here is usually a copolymer other than block copolymers, particularly, a
5 copolymer other than the later-described Component (D), more particularly a random copolymer.

When Component (a) is obtained by emulsion polymerization, gel content of the rubber-like polymer (a) is not specifically limited, but is preferably no
10 more than 98% by mass, and more preferably 40 to 98% by mass. Within this range of the gel content, a thermoplastic resin composition can be obtained which provides a molded article with excellent impact resistance.

15 The gel content can be determined by the following method. That is, 1 g of the rubber-like polymer is added to 100 ml of toluene, and the mixture is allowed to stand at room temperature for 48 hours. The mixture is then filtered through a 100-mesh metal screen (the mass is
20 defined as W_1 grams), and the filtered toluene-insoluble matter and the metal screen are vacuum-dried for 6 hours at 80°C, and are weighed (the mass is defined as W_2 grams). The gel content is calculated by the following equation:

25 Gel content(% by mass)=[$\{W_2 \text{ (g)} - W_1 \text{ (g)}\} / 1 \text{ (g)}\} \times 100 \dots (1)$

The gel content can be adjusted by appropriately setting kind and amount of a molecular weight adjusting

agent, polymerization time, polymerization temperature
polymerization conversion and the like during production
of the rubber-like polymer.

The aromatic vinyl compound constituting the vinyl
5 monomer (b) includes styrene, α -methylstyrene,
hydroxystyrene and the like. These can be used alone or
in combination of two or more. Of these, styrene and α -
methylstyrene are preferred.

Another vinyl monomer copolymerizable with the
10 aromatic vinyl compound includes vinyl cyanide compounds,
(meth)acrylate compounds, maleimide compounds, and
various other functional group containing unsaturated
compounds. Preferably, the vinyl monomer (b) comprises
an aromatic vinyl compound as an essential monomer
15 component, and optionally comprises, as a monomer
component, one or two or more kinds selected from the
group consisting of vinyl cyanide compounds,
(meth)acrylate compounds and maleimide compounds, and may
further comprises, as a monomer component, at least one
20 of various other functional group containing unsaturated
compounds. Various other functional group containing
unsaturated compounds include unsaturated acid compounds,
epoxy group-containing unsaturated compounds, hydroxyl
group-containing unsaturated compounds, oxazoline group-
25 containing unsaturated compounds, acid anhydride group-
containing unsaturated compounds, substituted or
unsubstituted amino group-containing unsaturated

compounds and the like. The various other functional group containing unsaturated compounds can be used alone or in combination of two or more.

The vinyl cyanide compound used here includes
5 acrylonitrile and methacrylonitrile, which may be used alone or in combination of two or more. If a vinyl cyanide compound is used, chemical resistance is imparted. When a vinyl cyanide compound is used, it is used in an amount of preferably 1 to 60% by mass, and more
10 preferably 5 to 50% by mass relative to the component (b).

The (meth)acrylate compound includes methyl acrylate, ethyl acrylate, butyl acrylate, methyl methacrylate, ethyl methacrylate, butyl methacrylate and the like, which may be used alone or in combination of
15 two or more. The use of a (meth)acrylate compound is preferable, since surface hardness improves. When a (meth)acrylate acid ester compound is used, it is used in an amount of preferably 1 to 80% by mass, and more preferably 5 to 80% by mass relative to the component (b).

20 The maleimide compound includes maleimide, N-phenylmaleimide, N-cyclohexylmaleimide and the like, which may be used alone or in combination of two or more. To introduce a maleimide unit, maleic anhydride can be copolymerized and then imidized. If a maleimide compound
25 is used, heat resistance is imparted. When a maleimide compound is used, it is used in an amount of preferably 1

to 60% by mass, and more preferably 5 to 50% by mass relative to the component (b).

The unsaturated acid compound includes acrylic acid, methacrylic acid, ethacrylic acid, maleic acid, fumaric acid, itaconic acid, crotonic acid, cinnamic acid and the like, which may be used alone or in combination of two or more.

The epoxy group-containing unsaturated compound includes glycidyl acrylate, glycidyl methacrylate, allyl glycidyl ether and the like, which may be used alone or in combination of two or more.

The hydroxyl group-containing unsaturated compound includes 3-hydroxy-1-propene, 4-hydroxy-1-butene, cis-4-hydroxy-2-butene, trans-4-hydroxy-2-butene, 3-hydroxy-2-methyl-1-propene, 2-hydroxyethyl methacrylate, 2-hydroxyethyl acrylate, N-(4-hydroxyphenyl) maleimide and the like, which may be used alone or in combination of two or more.

The oxazoline group-containing unsaturated compound includes vinyl oxazoline and the like, which may be used alone or in combination of two or more.

The acid anhydride group-containing unsaturated compound includes maleic anhydride, itaconic anhydride, citraconic anhydride and the like, which may be used alone or in combination of two or more.

The substituted or unsubstituted amino group-containing unsaturated compound includes aminoethyl

acrylate, propylaminoethyl acrylate, dimethylaminoethyl methacrylate, phenylaminoethyl methacrylate, N-vinyldiethylamine, N-acetylvinylamine, acrylamine, methacrylamine, N-methylacrylamine, acrylamide, N-
5 methylacrylamide, p-aminostyrene and the like, which may be used alone or in combination of two or more.

If the various other functional group containing unsaturated compound is used in a blend of the styrene resin and another polymer, compatibility between them can
10 be improved. Preferable monomers for achieving this effect include epoxy group-containing unsaturated compounds, carboxyl group-containing unsaturated compounds and hydroxyl group-containing unsaturated compounds. More preferable are hydroxyl group-containing
15 unsaturated compounds, and especially preferable is 2-hydroxyethyl(meth)acrylate.

The addition amount of the various other functional group containing unsaturated compounds in terms of the total of the various other functional group containing
20 unsaturated compounds used in the styrene resin, is preferably 0.1 to 20% by mass, and more preferably 0.1 to 10% by mass relative to the overall styrene resin.

The addition amount of the monomers other than the aromatic vinyl compound in the vinyl monomer (b) is
25 preferably no greater than 80% by mass, more preferably no greater than 60% by mass, and especially preferably no greater than 40% by mass, provided that the total of the

vinyl monomer (b) is 100% by mass. Preferable combinations of the monomers constituting the vinyl monomer (b) include: styrene/acrylonitrile; styrene/methyl methacrylate; styrene/acrylonitrile/methyl methacrylate; styrene/acrylonitrile/glycidyl methacrylate; styrene/acrylonitrile/2-hydroxyethylmethacrylate; styrene/acrylonitrile/(meth)acrylic acid; styrene/N-phenylmaleimide; styrene/methyl methacrylate/cyclohexylmaleimide, and the like. Especially preferable combinations of the monomer polymerized in the presence of the rubber-like polymer (a) include styrene/acrylonitrile at a mass ratio ranging from 65/45 to 90/10, styrene/methyl methacrylate at a mass ratio ranging from 80/20 to 20/80, and styrene/acrylonitrile/methyl methacrylate wherein the styrene content is 20 to 80% by mass, and the total of the acrylonitrile and the methyl methacrylate is at an arbitrary ratio within the range of 20 to 80% by mass.

Component (A) of the present invention can be produced using a commonly known polymerization method, such as emulsion polymerization, bulk polymerization, solution polymerization and suspension polymerization, as well as a combination thereof. Among these methods, preferable polymerization methods of polymers obtained by (co)polymerization of the vinyl monomer (b) in the presence of the rubber-like polymer (a) are emulsion

polymerization and solution polymerization. On the other hand, preferable polymerization methods of polymers obtained by (co)polymerization of the vinyl monomer (b) in the absence of the rubber-like polymer (a) are bulk
5 polymerization, solution polymerization, suspension polymerization and emulsion polymerization.

In the case of producing by emulsion polymerization, a polymerization initiator, a chain transfer agent, an emulsifier and the like can be used, all of which may be
10 known ones.

Examples of the polymerization initiator include cumene hydroperoxide, p-menthane hydroperoxide, diisopropylbenzene hydroperoxide, tetramethylbutyl hydroperoxide, tert-butyl hydroperoxide, potassium
15 persulfate, azobisisobutyronitrile and the like.

Further, as a polymerization initiation aid, redox systems such as various kinds of reducing agents, a sugar-containing iron pyrophosphate formulation and a sulfoxylate prescription are preferably used.

20 Examples of the chain transfer agent include octylmercaptan, n-dodecylmercaptan, t-dodecylmercaptan, n-hexylmercaptan, terpinolenes and the like.

Examples of the emulsifier include alkylbenzenesulfonates such as sodium
25 dodecylbenzenesulfonate, aliphatic sulfonates such as sodium lauryl sulfate, higher fatty acid salts such as potassium laurate, potassium stearate, potassium oleate

and potassium palmate, and rosin acid salts such as potassium rosinate.

Referring to the manner of using a rubber-like polymer (a) and a vinyl monomer (b) in emulsion polymerization, the monomer (b) may be entirely added and polymerized in the presence of the whole amount of the rubber-like polymer (a), or may be dividedly or continuously added and polymerized. Further, part of the rubber-like polymer (a) may be added in the course of polymerization.

After emulsion polymerization, the obtained latex is usually made to coagulate with a coagulant, and then washed with water and dried to give a powder of the component (A) of the present invention. At this time, latexes of two or more Components (A) obtained by emulsion polymerization may suitably be blended, and then coagulated. Examples of the coagulant used here include inorganic salts such as calcium chloride, magnesium sulfate and magnesium chloride, and acids such as sulfuric acid, hydrochloric acid, acetic acid, citric acid and malic acid.

Solvents which can be used when producing the component (A) by solution polymerization are inert solvents for polymerization, which are used in typical radical polymerization. Examples include aromatic hydrocarbons such as ethylbenzene and toluene, ketones

such as methyl ethyl ketone and acetone, acetonitrile, dimethylformamide, N-methylpyrrolidone and the like.

The polymerization temperature is preferably in a range of 80 to 140°C, and more preferably 85 to 120°C.

5 During polymerization, a polymerization initiator may be used, or polymerization may be conducted by thermal polymerization without using a polymerization initiator. Examples of polymerization initiators which can be preferably used include organic hydroperoxides
10 such as ketone peroxide, dialkyl peroxide, diacyl peroxide, peroxyester, hydroperoxide, azobisisobutyronitrile, benzoyl peroxide and the like.

Further, in the case of using a chain transfer agent, it may be mercaptans, terpinolenes, α -methylstyrene
15 dimers, or the like.

When bulk polymerization or suspension polymerization is employed for the production, the polymerization initiators and chain transfer agents described above for solution polymerization can be used.

20 The monomer content remaining in the component (A) obtained by the polymerization methods is preferably no greater than 10,000 ppm and more preferably no greater than 5,000 ppm.

Further, the polymer components obtained by
25 polymerizing the vinyl monomer (b) in the presence of the rubber-like polymer (a) are usually constituted by a copolymer in which the vinyl monomer (b) has graft-

copolymerized onto the rubber-like polymer (a) and an component of the vinyl monomer (b) which is not grafted onto the rubber-like polymer (a) (i.e., (co)polymers of the vinyl monomer (b) with each other).

5 Graft ratio of the Component (A) is preferably 20 to 200% by mass, more preferably 30 to 150% by mass, and especially preferably 40 to 120% by mass. The graft ratio can be determined from the following equation:

$$\text{Graft ratio (\% by mass)} = \{(T-S)/S\} \times 100 \dots (2)$$

10 In the above equation (2), T is the mass (g) of insoluble matter obtained by adding 1 g of Component (A) to 20 ml of acetone (or acetonitrile when an acrylic rubber is used as the rubber-like polymer (a)), shaking the mixture for 2 hours by a shaker, and then centrifuging the
15 mixture by a centrifuge (at a rotation speed of 23,000 rpm) for 60 minutes to separate the insoluble matter from the soluble matter, and S is the mass of the rubber-like polymer contained in 1 g of the Component (A).

 Limiting viscosity $[\eta]$ (measured at 30°C in methyl
20 ethyl ketone as solvent) of the soluble matter of the present Component (A) in acetone (or acetonitrile when an acrylic rubber is used for the rubber-like polymer (a)) is preferably 0.2 to 1.2 dl/g, more preferably 0.2 to 1.0 dl/g, and especially preferably 0.3 to 0.8 dl/g.

25 Average particle size of the grafted rubber-like polymer particles dispersed in the Component (A) according to the present invention is preferably 500 to

30,000 Å, more preferably 1,000 to 20,000 Å, and especially preferably 1,500 to 8,000 Å. Average particle size can be determined by a commonly known method using an electron microscope.

5 The addition amount of the Component (A) which constitutes the first thermoplastic resin composition of the present invention is 5 to 100% by mass, preferably 5 to 98% by mass, more preferably 10 to 98% by mass, even more preferably 15 to 95% by mass, still even more
10 preferably 15 to 93% by mass, and especially preferably 15 to 90% by mass, based on 100% by mass of the total of Component (A) and Component (B) of the present invention. If the addition amount is less than 5% by mass, there is a tendency for impact resistance to become inferior and
15 for antistatic property to deteriorate.

(2) Component (B)

 The olefin resin (B) according to the present invention is a polymer which comprises at least one of the olefins having 2 to 10 carbon atoms as a constituent
20 monomer unit. This olefin resin is preferably one which possesses a degree of crystallinity at room temperature with X-ray diffraction, and more preferably one having a degree of crystallinity of 20% or more and a melting
point of no less than 40°C. Further, this olefin resin
25 must have a molecular weight sufficient to be used as a resin for molding at room temperature.

For example, when it is mainly composed of polypropylene, the molecular weight should be equivalent to a melt flow rate as measured in accordance with JIS K-6758 of preferably 0.01 to 500 g/10 minutes, and more
5 preferably 0.05 to 100 g/10 minutes.

Examples of the olefins used as the constituent monomer of the olefin resin include ethylene, and α -olefins such as propylene, butene-1, pentene-1, hexene-1, 3-methylbutene-1, 4-methylpentene-1, 3-methylhexene-1 and
10 the like. Preferable are ethylene, propylene, butene-1, 3-methylbutene-1 and 4-methylpentene-1. Additionally, a non-conjugated diene such as 4-methyl-1,4-hexadiene, 5-methyl-1,4-hexadiene, 7-methyl-1,6-octadiene, and 1,9-decadiene can be used as a part of the polymer component.

15 The olefin resin (B) used in the present invention may be at least partly constituted by one from which polymerization catalyst has been removed, or, one which has been modified with an epoxy group, an amino group, a substituted amino group, a carboxyl group, an acid
20 anhydride group, an oxazoline group, a hydroxyl group and the like.

The addition amount of the Component (B) which constitutes the first thermoplastic resin composition of the present invention is 0 to 95% by mass, preferably 2
25 to 95% by mass, more preferably 5 to 90% by mass, even more preferably 7 to 90% by mass, and especially preferably 10 to 85% by mass, based on 100% by mass of

the total of Component (A) and Component (B) of the present invention. When the addition amount is more than 95% by mass, there is a tendency for impact resistance to become inferior and for antistatic property to
5 deteriorate.

The addition amount of the Component (B) which constitutes the second thermoplastic resin composition of the present invention is 70 to 97% by mass, preferably 75 to 96% by mass, and more preferably 77 to 96% by mass,
10 based on 100% by mass of the total of the Component (B) and the Component (C1). When the addition amount is less than 70% by mass, chemical resistance deteriorates, and when the addition amount exceeds 97% by mass, charge controlling property and surface appearance of molded
15 articles deteriorate.

The addition amount of the Component (B) which constitutes the third thermoplastic resin composition of the present invention is 30 to 96% by mass, preferably 35 to 91% by mass, and more preferably 42 to 91% by mass,
20 and especially preferably 42 to 85% by mass, based on 100% by mass of the total of Component (B), Component (C1) and Component (D). When the addition amount is less than 30% by mass, chemical resistance deteriorates, and when the addition amount exceeds 96% by mass, charge
25 controlling property and surface appearance of molded articles deteriorate.

(3) Component (C1)

Component (C1) of the present invention is a block copolymer comprising an olefin polymer block (c1-1) and a hydrophilic polymer block (c1-2). The Component (C1) is preferably a block copolymer having a structure wherein
5 both of these blocks are bonded in an alternately repeating manner. The block copolymer may be diblocks, or may be multiblocks consisting of tri- or greater blocks. The olefin polymer block (c1-1) is a (co)polymer consisting of above-described olefins. The olefin
10 polymer block (c1-1) has a number average molecular weight of preferably 800 to 20,000, more preferably 1,000 to 10,000, and especially preferably 1,200 to 6,000, as measured by gel permeation chromatography (GPC) and converted into polystyrene equivalent.

15 The block (c1-1) is chemically bonded to the block (c1-2). They are bonded via at least one selected from the group consisting of an ester bond, an amide bond, an ether bond, a urethane bond, an imide bond and the like. The blocks form a structure in which they are bonded in
20 an alternately repeating manner via these bonds.

For this reason, both of the molecule terminals of the block (c1-1) must be modified by a functional group that is reactive with functional groups of both molecule terminals of the block (c1-2). Examples of such
25 functional groups include a carboxylic acid group, a hydroxyl group, an amino group, an acid anhydride group, an oxazoline group, an epoxy group and the like.

Preferable methods for providing these functional groups include adding a carbon-carbon unsaturated compound having an above-mentioned functional group to a thermally-degraded component (c1-1) which has a carbon-
5 carbon double bond at a molecule terminal thereof.

Examples of the hydrophilic polymer of the block (c1-2) include polyether (c1-2-a), a polyether-containing hydrophilic polymer (c1-2-b), and an anionic polymer (c1-2-c).

10 Examples of the polyether (c1-2-a) include polyether diol, polyether diamine, and modified products thereof.

Examples of the polyether-containing hydrophilic polymer (c1-2-b) include a polyether ester amide having a polyether diol segment, a polyether amide imide having a
15 polyether diol segment, a polyether ester having a polyether diol segment, a polyether amide having a polyether diamine segment, and a polyether urethane having a polyether diol or polyether diamine segment.

Examples of the anionic polymer (c1-2-c) include
20 anionic polymers which comprise, as essential constituent units, a dicarboxylic acid having a sulfonyl group and the polyether (c1-2-a), and have preferably 2 to 80, and more preferably 3 to 60 sulfonyl groups in a molecule thereof.

25 These may be linear or branched.

Especially preferable as the block (c1-2) is the polyether (c1-2-a).

Examples of the polyether diol among the polyether (cl-2-a) include those represented by the general formula (I): $H-(OA^1)_n-O-E^1-O-(A^1O)_{n'}-H$; and the general formula (II): $H-(OA^2)_m-O-E^2-O-(A^2O)_m-H$. In general formula (I),

5 E^1 represents a residue that is a divalent hydroxyl group-containing compound from which hydroxyl groups have been removed; A^1 represents an alkylene group having 2 to 4 carbon atoms; and n and n' represent the numbers of alkylene oxide added per one hydroxyl group of the

10 divalent hydroxyl group-containing compound. The structure $(OA^1)_n$ and the structure $(OA^1)_{n'}$ may be the same as or different from each other. Further, when these structures are constituted by two or more kinds of oxyalkylene groups, the groups may be bonded in a block

15 or random manner or a combination thereof. Generally, n and n' are from 1 to 300, preferably 2 to 250, and especially preferably 10 to 100. Further, n and n' may be the same or different.

Examples of the divalent hydroxyl group-containing

20 compound include compounds containing two alcoholic or phenolic hydroxyl groups in one molecule; i.e. dihydroxy compounds. Specific examples include divalent alcohols (e.g. aliphatic, alicyclic or aromatic divalent alcohols having 2 to 12 carbon atoms), divalent phenols having 6

25 to 18 carbon atoms, diols containing a tertiary amino group and the like.

Examples of aliphatic divalent alcohols include, for example, alkylene glycols such as ethylene glycol, propylene glycol and the like; 1,4-butanediol, 1,6-hexanediol, neopentyl glycol, 1,12-dodecanediol and the
5 like.

Examples of alicyclic divalent alcohols include, for example, 1,2- and 1,3-cyclopentanediol, 1,2, 1,3- and 1,4-cyclohexanediol, 1,4-cyclohexanedimethanol and the like. Examples of aromatic divalent alcohols include,
10 for example, xylenediol and the like.

Examples of divalent phenols include monocyclic divalent phenols such as hydroquinone, catechol, resorcin, urushiol and the like; bisphenols such as bisphenol A, bisphenol F, bisphenol S, 4,4'-dihydroxydiphenyl-2,2-
15 butane, dihydroxybiphenyl, dihydroxydiphenyl ether and the like; and fused polycyclic divalent phenols such as dihydroxynaphthalene, binaphthol and the like.

In general formula (II), E^2 represents a residue that is the divalent hydroxyl group-containing compound
20 described above for the general formula (I) from which hydroxyl groups have been removed; and A^2 at least partly represents a substituted alkylene group represented by general formula (III): $-\text{CHR}-\text{CHR}'-$ (wherein one of R and R' is a group represented by general formula (IV): -
25 $\text{CH}_2\text{O}(\text{A}^3\text{O})_x\text{R}''$, the other being hydrogen, and in general formula (IV), x denotes an integer of from 1 to 10; R'' represents hydrogen or an alkyl group having from 1 to 10

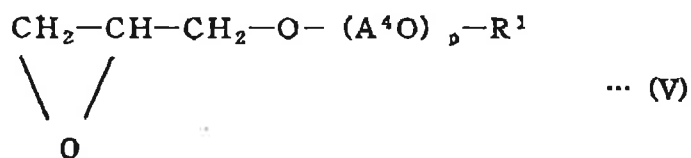
carbon atoms, aryl group, alkylaryl group, arylalkyl group, or acyl group; and A^3 represents an alkylene group having from 2 to 4 carbon atoms), whilst the remaining A^2 may be an alkylene group having from 2 to 4 carbon atoms.

5 The structure $(OA^2)_m$ and the structure $(A^2O)_{m'}$ may be the same or different from each other. m and m' are preferably from 1 to 300, more preferably 2 to 250, and especially preferably 10 to 100. Further, m and m' may be the same or different.

10 The polyether diol represented by general formula (I) can be prepared by an addition reaction of alkylene oxide to a divalent hydroxyl group-containing compound. Examples of alkylene oxides include alkylene oxides having from 2 to 4 carbon atoms, e.g. ethylene oxide,
15 propylene oxide, 1,2-butylene oxide, 1,4-butylene oxide, 2,3-butylene oxide, and 1,3-butylene oxide, as well as combinations of two or more thereof. When two or more kinds of alkylene oxides are used in combination, they may be bonded in either of random and/or block manners.
20 Preferable examples of the alkylene oxide include ethylene oxide alone or a combination of ethylene oxide and another alkylene oxide which is added in random and/or block manner. The number of alkylene oxides to be added is preferably 1 to 300, more preferably 2 to 250,
25 and especially preferably 10 to 100, per one hydroxyl group of the divalent hydroxyl group-containing compound.

Preferable examples of the production method for the polyether diol represented by general formula (II) include the following methods (A) and (B).

(A) A method in which the above-described divalent hydroxyl group-containing compound as a starting material is polymerized with a glycidyl ether represented by the general formula (V),



(wherein A⁴ represents an alkylene group having from 2 to 4 carbon atoms; p denotes an integer of from 1 to 10; and R¹ represents hydrogen or an alkyl group having from 1 to 10 carbon atoms, aryl group, alkylaryl group, arylalkyl group or acyl group.)

and optionally copolymerized with an alkylene oxide having from 2 to 4 carbon atoms.

(B) A method in which the polyether diol is produced via a polyether having a chloromethyl group on a side chain using the divalent hydroxyl group-containing compound as a starting material. More specifically, a polyether having a chloromethyl group on a side chain is obtained by addition (co)polymerization of epichlorohydrin or epichlorohydrin with an alkylene oxide, and then the polyether diol is produced by reacting the polyether with a polyalkylene glycol having from 2 to 4 carbon atoms and R¹X (wherein R¹ is as described above;

and X represents chlorine, bromine or iodine) in the presence of an alkali, or by reacting the polyether with a polyalkylene glycol monocarbyl ether having from 2 to 4 carbon atoms in the presence of an alkali.

5 As the alkylene oxide having 2 to 4 carbon atoms which is used here, all that are described above can be used.

 The Component (C1) of the present invention can be obtained by polymerizing the olefin polymer block (c1-1) and the hydrophilic polymer block (c1-2) by a known method. For example, the Component (C1) can be produced by polymerizing the block (c1-1) and the block (c1-2) under reduced pressure at 200 to 250°C. During the polymerization reaction, a known polymerization catalyst
15 can also be used.

 Further, while a known polymerization catalyst can be used during the polymerization reaction, preferable catalysts include one kind or a combination of two kinds or more selected from tin catalysts such as monobutyl tin oxide, antimony catalysts such as antimony trioxide,
20 antimony dioxide and the like, titanium catalysts such as tetrabutyl titanate and the like, zirconium catalysts such as zirconium hydroxide, zirconium oxide, zirconyl acetate and the like, and group IIB organic acid salt
25 catalysts.

 For the purpose of further improving antistatic property or charge controlling property, which is an

object of the present invention, the Component (C1) can contain a salt (H) of at least one member selected from the group consisting of alkali metals and alkali earth metals. This component may be incorporated therein
5 before polymerization of the Component (C1), during polymerization of the Component (C1), or after polymerization of the Component (C1). Further, this component can also be incorporated therein during production of the resin composition according to the
10 present invention, or incorporated therein in a manner in which the above methods are combined.

Examples of the salts of the Component (H) include salts of organic acids, sulfonic acids and inorganic acids, and halides of alkali metals such as lithium,
15 sodium and potassium and/or alkali earth metals such as magnesium and calcium.

Specific preferable examples of the Component (H) include halides of alkali metals such as lithium chloride, sodium chloride, potassium chloride, lithium bromide,
20 sodium bromide, potassium bromide and the like; inorganic acid salts of alkali metals such as lithium perchlorate, sodium perchlorate, potassium perchlorate and the like; organic acid salts of alkali metals such as potassium acetate, lithium stearate and the like; alkali metal
25 salts of alkylsulfonic acids having an alkyl group with 8 to 24 carbon atoms such as octylsulfonic acid, dodecylsulfonic acid, tetradecylsulfonic acid,

stearylsulfonic acid, tetracosylsulfonic acid, 2-ethylhexylsulfonic acid and the like; alkali metal salts of aromatic sulfonic acids such as phenylsulfonic acid, naphthylsulfonic acid and the like; alkali metal salts of alkylbenzenesulfonic acids having an alkyl group with 6 to 18 carbon atoms such as octylphenylsulfonic acid, dodecylphenylsulfonic acid, dibutylphenylsulfonic acid, dinonylphenylsulfonic acid and the like; alkali metal salts of alkylnaphthalenesulfonic acids having an alkyl group with 2 to 18 carbon atoms such as dimethylnaphthylsulfonic acid, diisopropylnaphthylsulfonic acid, dibutylnaphthylsulfonic acid and the like; and alkali metal salts of fluorinated sulfonic acids such as trifluoromethanesulfonic acid and the like. These compounds may be used alone or in combination of two or more. Component (H) can be used in a range of preferably 0.001 to 10% by mass, more preferably 0.01 to 5% by mass, even more preferably 0.01 to 3% by mass, and especially preferably 0.01 to 2% by mass, relative to the Component (C1) of the present invention.

A preferable ratio (mass ratio) of block (c1-1)/block (c1-2) in Component (C1) of the present invention is a range of 10-90/10-90, more preferably 20-80/20-80 and especially preferably 30-70/30-70.

Such a block copolymer (C1) can be produced, for example, by the methods described in Japanese Patent

Laid-Open (Kokai) No. 2001-278985 and Japanese Patent
Laid-Open (Kokai) No. 2003-48990. The Component (C1) of
the present invention can also be available from the
PELESTAT 300 series and the like manufactured by Sanyo
5 Chemical Industries, Ltd. including the products 300, 303
and 230 (trade names).

The addition amount of the Component (C1) which
constitutes the first thermoplastic resin composition of
the present invention is 0.5 to 100 parts by mass,
10 preferably 0.5 to 80 parts by mass, more preferably 1 to
60 parts by mass, and especially preferably 2 to 50 parts
by mass, based on 100 parts by mass of the total of
Component (A) and Component (B) of the present invention.
When the addition amount is less than 0.5 parts by mass,
15 antistatic effects are not obtained, chemical resistance
effects are insufficient and impact resistance
deteriorates. When it exceeds 100 parts by mass, impact
resistance deteriorates.

The addition amount of the Component (C1) which
20 constitutes the second thermoplastic resin composition of
the present invention is 3 to 30% by mass, preferably 4
to 25% by mass, more preferably 4 to 23% by mass, and
especially preferably 5 to 23% by mass, based on 100% by
mass of the total of the Component (B) and the Component
25 (C1) of the present invention. When the addition amount
is less than 3% by mass, antistatic property deteriorate.
When the addition amount exceeds 30% by mass, chemical

resistance and surface appearance of molded articles deteriorate.

The addition amount of the Component (C1) which constitutes the third thermoplastic resin composition of the present invention is 3 to 30% by mass, preferably 4 to 25% by mass, more preferably 4 to 23% by mass, and especially preferably 5 to 23% by mass, based on 100% by mass of the total of the Component (B), the Component (C1) and the Component (D) of the present invention.

When the addition amount is less than 3% by mass, charge controlling property deteriorates. When the addition amount exceeds 30% by mass, chemical resistance and surface appearance of molded articles deteriorate.

(4) Component (C2)

In order to further improve the antistatic property or charge controlling property, the first thermoplastic resin composition of the present invention may further comprise, in addition to the above Component (A), Component (B) and Component (C1), at least one selected from the group consisting of the following Components (C2-1), (C2-2), (C2-3) and (C2-4):

Component (C2-1): a polyetherpolyamide and/or polyetherpolyester;

Component (C2-2): a nonionic antistatic agent;

Component (C2-3): a boron compound; and

Component (C2-4): a lithium salt.

The second thermoplastic resin composition of the present invention may further comprise the above Component (C2-2) in addition to the above Component (B) and Component (C1), and as desired, may further comprise
5 at least one selected from the group consisting of the above Component (C2-1), Component (C2-3) and Component (C2-4).

The third thermoplastic resin composition of the present invention may further comprise the above
10 Component (C2-2) in addition to the above Component (B), Component (C1) and Component (D), and as desired, may further comprise at least one selected from the group consisting of the above Component (C2-1), Component (C2-3) and Component (C2-4).

15 (4-1) Component (C2-1)

Component (C2-1) of the present invention is a polyetherpolyamide and/or polyetherpolyester.

Examples of polyamides used here include a polyamide derived from a diamine component such as aliphatic,
20 alicyclic or aromatic diamines, including ethylenediamine, tetramethylenediamine, hexamethylenediamine, decamethylenediamine, 2,3,4- or 2,4,4-trimethylhexamethylenediamine, 1,3- or 1,4-bis(aminomethyl)cyclohexane, bis(p-aminohexyl)methane,
25 phenyldiamine, m-xylenediamine, p-xylenediamine and the like, with an aliphatic, alicyclic or aromatic dicarboxylic acid such as adipic acid, suberic acid,

sebacic acid, cyclohexanedicarboxylic acid, terephthalic acid, isophthalic acid and the like; a polyamide obtained by ring-opening polymerization of a lactam such as caprolactam, lauryllactam and the like; a polyamide
5 derived from an aminocarboxylic acid such as ω -aminocaproic acid, ω -aminoenanthic acid, aminoundecanoic acid, 1,2-aminododecanoic acid and the like; and a copolymer polyamide thereof, as well as a mixture of these polyamides.

10 The polyetherpolyamide of Component (C2-1) of the present invention comprises a polyether component. As the polyether component used here, all the component (c1-2) described above for the Component (C1) may be used.

A preferable polymerization method for the
15 polyetherpolyamide of the present invention is a thermal melt polymerization method. Preferable specific examples of this method will be shown in the following.

(i) A method in which a polyamide obtained by polymerization is mixed with a dicarboxylic acid to
20 carboxylate both terminals of the polyamide component and then mixed with a poly(alkyleneoxide)glycol for polymerization to produce a polyetherpolyamide.

(ii) A method in which a polyetherpolyamide is obtained by adding a dicarboxylic acid compound in excess during
25 polymerization of polyamide so that both terminals of polyamide molecules are essentially carboxylated, and

then adding a poly(alkyleneoxide)glycol for polymerization.

(iii) A method in which a polyetherpolyamide is obtained by adding polyamide generating components, excess
5 dicarboxylic acid compounds, and a predetermined amount of a poly(alkyleneoxide)glycol all together for polymerization.

Among the methods, method (i) is an especially preferable method.

10 Examples of the dicarboxylic acid used for carboxylating the molecule terminals of the polyamide component include adipic acid, suberic acid, sebacic acid, maleic acid, citraconic acid, maleic anhydride, citraconic anhydride, cyclohexanedicarboxylic acid,
15 terephthalic acid, isophthalic acid and the like. The number average molecular weight of the polyamide according to the present invention is preferably in the range of 500 to 20,000, more preferably 500 to 10,000, and especially preferably 500 to 5,000 for achieving the
20 object of the present invention.

The mass ratio between the polyamide component and the polyether component (polyamide/polyether) in the polyetherpolyamide according to the present invention is preferably in a range of 90/10 to 10/90, more preferably
25 80/20 to 20/80, and especially preferably 70/30 to 30/70.

While the molecular weight of the polyetherpolyamide according to the present invention is not especially

limited, the reduced viscosity (η_{sp}/C) (measured in formic acid solution, 0.5 g/100 ml, at 25°C) is preferably 1 to 3 dl/g, and more preferably 1.2 to 2.5 dl/g.

5 The polyetherpolyamide according to the present invention can be used alone or in combination of two or more.

 Examples of the polyester in Component (C2-1) of the present invention include polymers obtained from (1) a
10 dicarboxylic acid having 4 to 20 carbon atoms and/or ester-forming derivatives thereof, and (2) a diol component. Examples of the above (1) used here are listed below. The term "carbon atoms" as used here refers to the total number of carbon atoms constituting
15 the carboxylic group and the chain or ring which is directly bonded to the carbon of the carboxylic group.

 Examples of the dicarboxylic acids having 4 to 20 carbon atoms include: (a) aliphatic dicarboxylic acids having 4 to 20 carbon atoms such as succinic acid, adipic
20 acid, azelaic acid, sebacic acid, α,ω -dodecanedicarboxylic acid, dodecenylsuccinic acid, octadecenylldicarboxylic acid and the like; (b) alicyclic dicarboxylic acids having 8 to 20 carbon atoms such as 1,4-cyclohexanedicarboxylic acid and the like; (c)
25 aromatic dicarboxylic acids having 8 to 12 carbon atoms such as terephthalic acid, isophthalic acid, 1,4-naphthalenedicarboxylic acid, 2,3-naphthalenedicarboxylic

acid, 2,6-naphthalenedicarboxylic acid, 2,7-naphthalenedicarboxylic acid and the like; (d) substituted aromatic dicarboxylic acids having 8 to 12 carbon atoms and having a sulfonic acid group bonded to the aromatic ring thereof such as 5-sodiumsulfoisophthalic acid, 5-potassiumsulfoisophthalic acid, 5-tetrabutylphosphoniumsulfoisophthalic acid and the like. Examples of the ester-forming derivatives of a dicarboxylic acid having 4 to 20 carbon atoms include lower alcohol esters of the above (a) to (d). Such examples include dimethyl succinate, dimethyl adipate, dimethyl azelate, dimethyl sebacate, dimethyl α,ω -dodecanedicarboxylate, dimethyl dodecenylsuccinate, dimethyl octadecenylldicarboxylate, dimethyl 1,4-cyclohexanedicarboxylate, diethyl succinate, diethyl adipate, diethyl azelate, diethyl sebacate, diethyl α,ω -dodecanedicarboxylate, diethyl dodecenylsuccinate, diethyl octadecenylldicarboxylate, diethyl 1,4-cyclohexanedicarboxylate, dimethyl terephthalate, diethyl terephthalate, di(2-hydroxyethyl) terephthalate, dimethyl isophthalate, diethyl isophthalate, di(2-hydroxyethyl) isophthalate, dimethyl 1,4-naphthalenedicarboxylate, diethyl 1,4-naphthalenedicarboxylate, dimethyl 2,6-naphthalenedicarboxylate, diethyl 2,6-naphthalenedicarboxylate, dimethyl 2,7-naphthalenedicarboxylate, diethyl 2,7-naphthalenedicarboxylate, dimethyl 5-

sodiumsulfoisophthalate, dimethyl 5-
potassiumsulfoisophthalate, (2-hydroxyethyl) 5-
sodiumsulfoisophthalate, (2-hydroxyethyl) 5-
potassiumsulfoisophthalate and the like. These can be

5 used alone or in combination of two or more. Among these,
terephthalic acid, isophthalic acid, 2,6-
naphthalenedicarboxylic acid, 5-sodiumsulfoisophthalic
acid, and ester-forming derivatives thereof, are
preferable.

10 The polyetherpolyester of the present invention
comprises the above polyester component and a polyether
component. As the polyether component used here, all the
above components (cl-2) may be used. A preferable
polymerization method for the polyetherpolyester of the
15 present invention is a thermal melt polymerization method.
Preferable specific examples of this method will be shown
in the following.

(i) A method in which a polyester obtained by
polymerization is mixed with a dicarboxylic acid to
20 carboxylate both terminals of the polyester component,
and then mixed with a poly(alkyleneoxide)glycol for
polymerization to produce a polyetherpolyester.

(ii) A method in which a polyetherpolyester is obtained
by adding a dicarboxylic acid compound in excess during
25 polymerization of polyester so that both terminals of the
polyester molecules are essentially carboxylated, and

then adding a poly(alkyleneoxide)glycol for polymerization.

(iii) A method in which a polyetherpolyester is obtained by adding polyester generating components, excess
5 dicarboxylic acid compounds, and a predetermined amount of a poly(alkyleneoxide)glycol all together for polymerization.

Examples of the dicarboxylic acid used for carboxylating the molecule terminals of the polyester
10 component include adipic acid, suberic acid, sebacic acid, maleic acid, citraconic acid, maleic anhydride, citraconic anhydride, cyclohexanedicarboxylic acid, terephthalic acid, isophthalic acid and the like. The number average molecular weight of the polyester of the
15 present invention is preferably in the range of 300 to 20,000, more preferably 300 to 10,000, and especially preferably 500 to 5,000 for achieving the object of the present invention.

The mass ratio between the polyester component and
20 the polyether component (polyester/polyether) in the polyetherpolyester according to the present invention is preferably in a range of 90/10 to 10/90, more preferably 80/20 to 20/80, and especially preferably 70/30 to 30/70.

While the molecular weight of the polyetherpolyester
25 according to the present invention is not especially limited, the reduced viscosity (η_{sp}/C) (measured in a mixed solvent of phenol/tetrachloroethane at the mass

ratio of 40/60, the concentration of 1.0 g/dl, and 35°C) is preferably 0.3 to 2.5 dl/g, and more preferably 0.5 to 2.5 dl/g.

The polyetherpolyester of the present invention can
5 be used alone or in combination of two or more.

For the purpose of improving antistatic property, the above Component (H) can be added to the polyetherpolyamide or polyetherpolyester of Component (C2-1) of the present invention in the course of the
10 polymerization process (including before polymerization, at the start of polymerization, during polymerization, and after polymerization). The amount of Component (H) used in the Component (C2-1) of the present invention is in a range of 0.001 to 20% by mass, more preferably 0.01
15 to 15% by mass, and especially preferably 0.1 to 10% by mass.

In the first thermoplastic resin composition of the present invention, Component (C2-1) can be used in a range of preferably 0.001 to 60 parts by mass, more
20 preferably 0.5 to 50 parts by mass, even more preferably 0.5 to 40 parts by mass, still even more preferably 1 to 35 parts by mass, and especially preferably 1 to 30 parts by mass, based on 100 parts by mass of the total of Component (A) and Component (B). When the addition
25 amount is less than 0.001 parts by mass, antistatic property and surface gloss of molded articles deteriorate.

When the addition amount exceeds 60 parts by mass, impact resistance deteriorates.

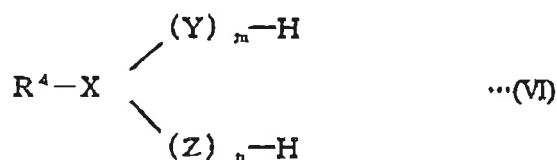
In the second and third thermoplastic resin compositions of the present invention, Component (C2-1)
5 can be used in a range of preferably 0.001 to 60 parts by mass, more preferably 0.5 to 50 parts by mass, even more preferably 0.5 to 40 parts by mass, still even more preferably 1 to 35 parts by mass, and especially preferably 1 to 30 parts by mass, based on 100 parts by
10 mass of Component (B). When the addition amount is less than 0.001 parts by mass, antistatic property and surface gloss of molded articles deteriorate. When the addition amount exceeds 60 parts by mass, impact resistance deteriorates.

15 The ratio (C1)/(C2-1) between the Component (C1) and the Component (C2-1) to be used in the present invention is, by mass ratio, preferably in a range of 4-60/40-96, more preferably 6-55/45-94, and especially preferably 8-48/52-92. In the region where the ratio of the Component
20 (C1) is less than 4% by mass and the ratio of the Component (C2-1) is more than 96% by mass relative to 100% by mass of the total of the Component (C1) and the Component (C2-1), there is a tendency for antistatic property to deteriorate undesirably. In the region where
25 the ratio of the Component (C1) is more than 60% by mass and the ratio of the Component (C2-1) is less than 40% by

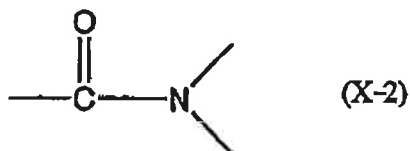
mass, there is a tendency for surface gloss of molded articles to deteriorate undesirably.

(4-2) Component (C2-2)

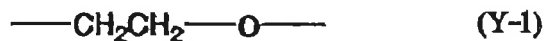
Examples of the nonionic antistatic agent of Component (C2-2) of the present invention include polyvalent alcohol esters (C2-2-1) and nitrogen-containing compounds (C2-2-2) represented by the general formula (VI). These can be used alone or in combination of two or more.

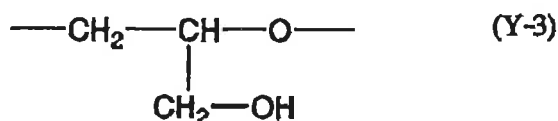
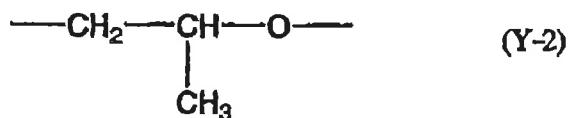


(wherein R^4 represents an alkyl or alkenyl group having 8 to 22 carbon atoms, X is a group represented by the following formulae X-1 or X-2,



and Y and Z, which may be the same or different, are each a group represented by the following formulae Y-1, Y-2 or Y-3,





and m+n is an integer of from 2 to 5.)

Examples of Component (C2-2-1) include glycerin

- 5 monostearate, glycerin monomyristate, glycerin
monopalmitate, glycerin monostearate, glycerin
monobehenate, glycerin monooleate, diglycerin monolaurate,
diglycerin monomyristate, diglycerin monopalmitate,
diglycerin monostearate, diglycerin monobehenate,
10 diglycerin monooleate, sorbitan monolaurate, sorbitan
monomyristate, sorbitan monopalmitate, sorbitan
monostearate, sorbitan monobehenate, sorbitan monolaurate
and the like. These can be used alone or in combination
of two or more. Especially preferable are glycerin
15 monostearate, diglycerin monostearate, glycerin
monolaurate, diglycerin monolaurate, sorbitan
monostearate, and a Component (C2-2-1) which comprises
these compounds in an amount of no less than 20% by mass.

Examples of Component (C-2-2) include amines such as

- 20 lauryldiethanolamine, myristyldiethanolamine,
palmytyldiethanolamine, stearyldiethanolamine,
oleyldiethanolamine, lauryldiisopropanolamine,
myristyldiisopropanolamine, palmytyldiisopropanolamine,

stearyldiisopropanolamine, oleyldiisopropanolamine, N,N-bishydroxyethylalkylamine (the alkyl group of which has from 12 to 22 carbon atoms) and the like; or amides such as lauryldiethanolamide, myristyldiethanolamide,
5 palmityldiethanolamide, behenyldiethanolamide, oleyldiethanolamide, lauryldiisopropanolamide, myristyldiisopropanolamide, palmityldiisopropanolamide, stearyldiisopropanolamide, oleyldiisopropanolamide and the like. These can be used alone or in combination of
10 two or more. The amine compounds are preferable. More preferable is a Component (C2-2-2) which comprises at least 20% by mass of each of lauryldiethanolamine and stearyldiethanolamine.

For the purpose of improving antistatic performance,
15 a commonly known additive may be mixed with the above-described compounds. Examples thereof include higher alcohols having 12 to 18 carbon atoms, a lubricant, silica, calcium silicate and the like. Further, to improve miscibility, they may be used in a form of a
20 master batch.

The nonionic antistatic agent of Component (C2-2) of the present invention is also commercially available as ELECTROSTRIPPER EA, TS-3B, TS-6B, TS-5, TS-2B (trade names) and the like manufactured by Kao Corporation.

25 In the first thermoplastic resin composition of the present invention, Component (C2-2) can be used in a range of preferably 0.001 to 60 parts by mass, more

preferably 0.005 to 50 parts by mass, even more preferably 0.01 to 30 parts by mass, still even more preferably 0.05 to 20 parts by mass, and most preferably 0.5 to 10 parts by mass, based on 100 parts by mass of
5 the total of Component (A) and Component (B). When the addition amount is less than 0.001 parts by mass, charge controlling property deteriorates. When the addition amount exceeds 60 parts by mass, chemical resistance and surface appearance of molded articles deteriorate.

10 In the second thermoplastic resin composition of the present invention, Component (C2-2) can be used in a range of preferably 0.01 to 10 parts by mass, more preferably 0.05 to 8 parts by mass, and even more preferably 0.1 to 5 parts by mass, based on 100 parts by
15 mass of the total of Component (B) and Component (C1). When the addition amount is less than 0.01 parts by mass, charge controlling property deteriorates. When the addition amount exceeds 10 parts by mass, chemical resistance and surface appearance of molded articles
20 deteriorate.

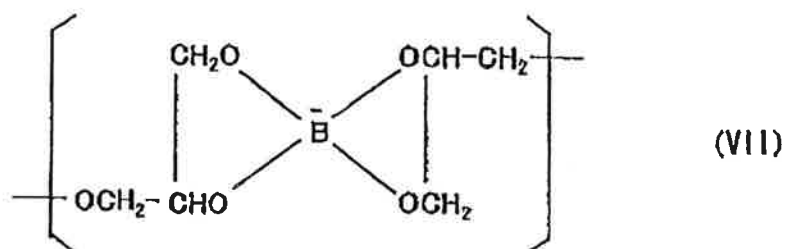
In the third thermoplastic resin composition of the present invention, Component (C2-2) can be used in a range of preferably 0.01 to 10 parts by mass, more preferably 0.05 to 8 parts by mass, and even more
25 preferably 0.1 to 5 parts by mass, based on 100 parts by mass of the total of Component (B), Component (C1) and Component (D). When the addition amount is less than

0.01 parts by mass, charge controlling property deteriorates. When the addition amount exceeds 10 parts by mass, chemical resistance and surface appearance of molded articles deteriorate.

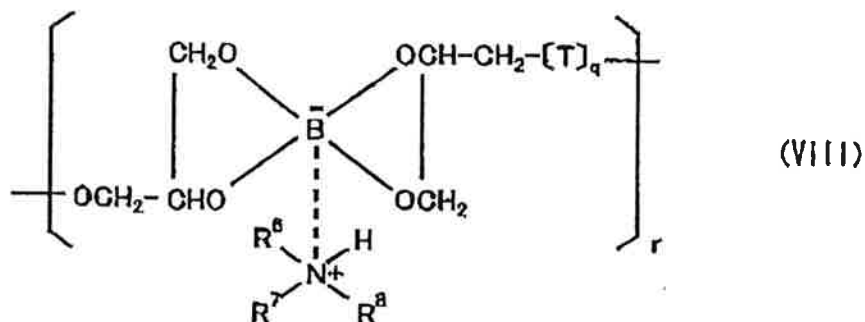
5 (4-3) Component (C2-3)

Component (C2-3) according to the present invention is a boron compound; i.e. a compound which contains the element boron. This boron compound (C2-3) can be used alone or in combination of two or more.

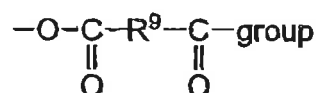
10 The boron compound (C2-3) is preferably an organic boron polymer compound. As this organic boron polymer compound, compounds containing a unit represented by the below general formula (VII) are preferable.



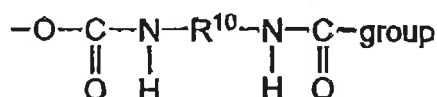
15 Examples of compounds containing a unit represented by the above general formula (VII) are preferably a polymeric charge transfer type conjugate which is a reaction product of a semipolar organic boron polymer compound with one or two or more of tertiary amine having
20 a hydroxyl group and 5 to 82 carbon atoms in total, in a proportion of one basic nitrogen atom to one boron atom, as represented by the below general formula (VIII).



In the formula (VIII), q is 0 or 1, and when q=1, T denotes $-(\text{T}^1)_s-(\text{T}^2)_t-(\text{T}^3)_u-$ (wherein T^1 and T^3 may be the same or different, and are oxygen-containing hydrocarbon groups having one terminal ether residue and no more than 100 carbon atoms in total, and T^2 is represented by,



(wherein R^9 is a hydrocarbon group having 1 to 82 carbon atoms), or

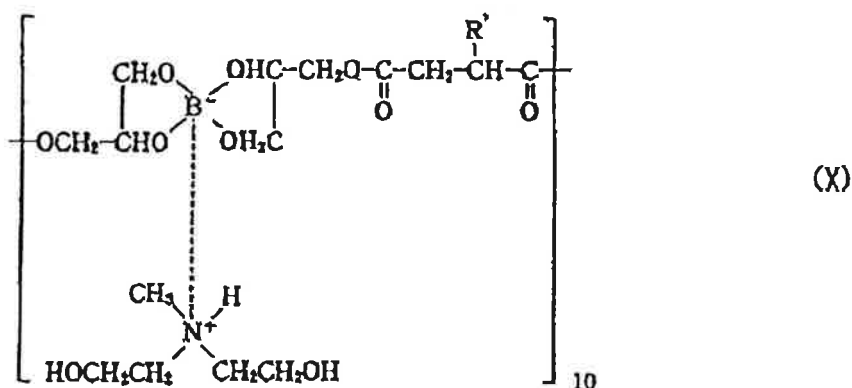
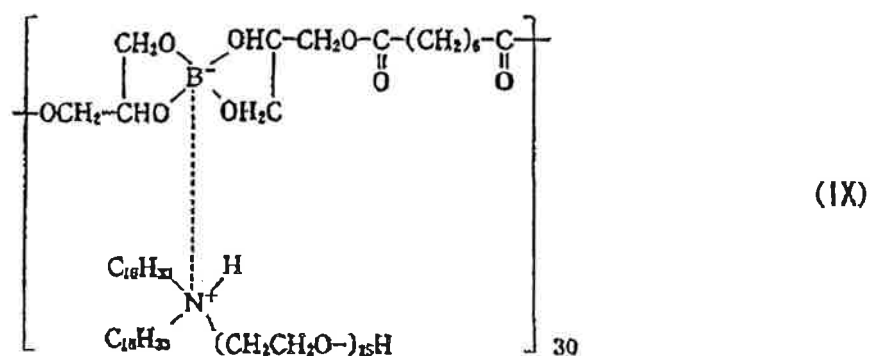


(wherein R^{10} is a hydrocarbon group having 2 to 13 carbon atoms); s, t and u each being 0 or 1); R^6 , R^7 , and R^8 are organic group which may be the same or different; and r is from 10 to 10,000.

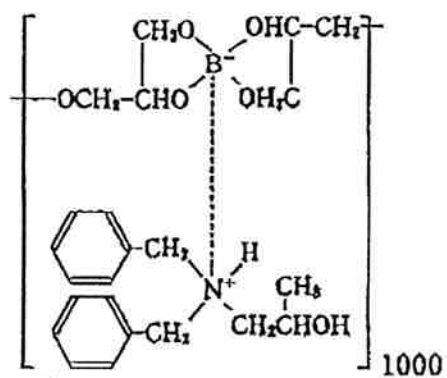
Examples of R^6 , R^7 , and R^8 in the above general formula (VIII) include hydrocarbon group, alkoxy group, phenoxy group, benzyloxy group, alkylene glycol group and the like. These groups may contain a functional group

such as a hydroxyl group or the like, or may have a substituent.

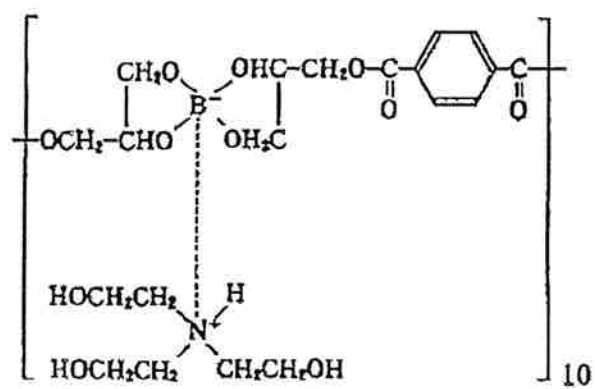
Examples of the polymeric charge transfer type conjugate include conjugates represented by the below
5 chemical formulae (IX) to (XVI). In the following chemical formulae, a hydrogen atom or a hydroxyl group is usually bound to each of the terminal carbon and oxygen atoms.



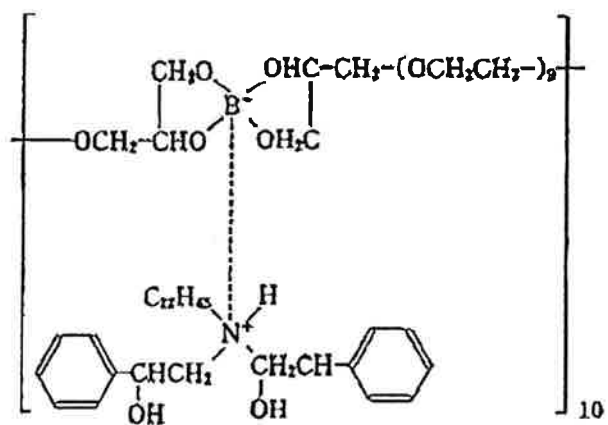
(wherein R' is a polybutene residue having an average degree of polymerization of 20)



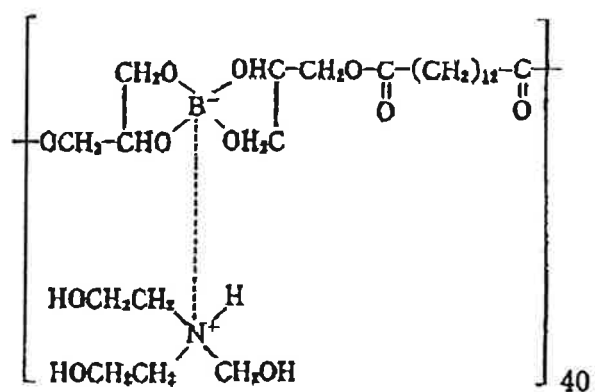
(XI)



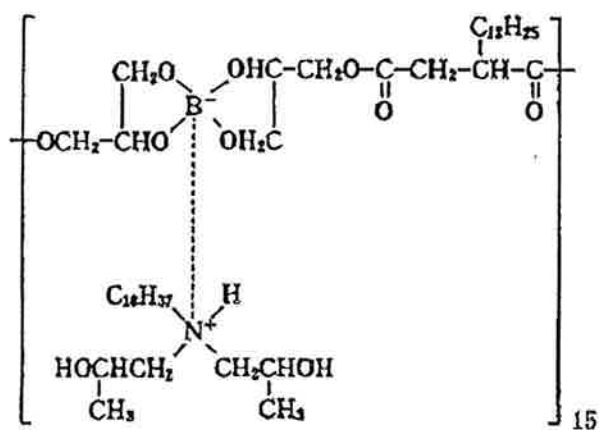
(XII)



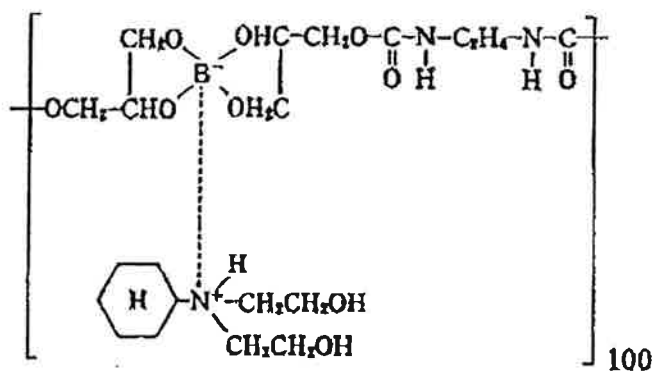
(XIII)



(XIV)



(XV)



(XVI)

The polymeric charge transfer type conjugate can be
 5 produced by the methods described in Japanese Patent No.
 2573986.

In addition, a commercially available product may be used as the boron compound (C2-3). A preferable example is "HIGH BORON 400N" or similar product manufactured by Boron International Co., Ltd.

5 The boron compound (C2-3) according to the present invention may be mixed singly during production of the thermoplastic resin composition, or may be mixed as a mixture (composition) with a polymer of the Components (A), (B), (C1) or the like. Examples of the latter
10 include "HIGH BORON MB400N-8LDPE" (a master batch with polyethylene as a matrix) or similar product manufactured by Boron International Co., Ltd.

 In the first thermoplastic resin composition of the present invention, the Component (C2-3) content is
15 preferably 0.001 to 60 parts by mass, more preferably 0.001 to 50 parts by mass, even more preferably 0.01 to 30 parts by mass, still even more preferably 0.05 to 20 parts by mass, especially preferably 0.05 to 10 parts by mass, and most preferably 0.1 to 5 parts by mass, based
20 on 100 parts by mass of the total of Component (A) and Component (B). When the content is less than 0.001 parts by mass, there is a tendency for antistatic property to deteriorate. When the content exceeds 60 parts by mass, there is a tendency for surface appearance to deteriorate.

25 In the second and third thermoplastic resin compositions of the present invention, the Component (C2-3) content is preferably 0.001 to 60 parts by mass, more

preferably 0.001 to 50 parts by mass, even more
preferably 0.01 to 30 parts by mass, still even more
preferably 0.05 to 20 parts by mass, especially
preferably 0.05 to 10 parts by mass, and most preferably
5 0.1 to 5 parts by mass, based on 100 parts by mass of
Component (B),. When the content is less than 0.001
parts by mass, there is a tendency for antistatic
property to deteriorate. When the content exceeds 60
parts by mass, there is a tendency for surface appearance
10 to deteriorate.

A preferably content ratio of Component (C1) and
Component (C2-3) is 38 to 99.8% by mass/0.2 to 62% by
mass, more preferably 67 to 99.7% by mass/0.3 to 33% by
mass, and even more preferably 75 to 99.2% by mass/0.8 to
15 25% by mass, provided that the total of these components
is taken as 100% by mass. Within this range, even better
antistatic property can be attained.

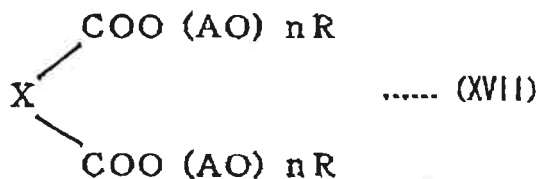
(4-4) Component (C2-4)

Examples of the lithium salt of Component (C2-4) of
20 the present invention include organic acid salts,
inorganic acid salts and halogenated substances of
lithium. Preferable examples include at least one
compound selected from lithium perchlorate, lithium
trifluoromethanesulfonate, lithium
25 bis(trifluoromethanesulfonyl)imide and lithium
tris(trifluoromethanesulfonyl)methane. More preferable
examples include at least one compound selected from

lithium trifluoromethanesulfonate, lithium
bis(trifluoromethanesulfonyl)imide and lithium
tris(trifluoromethanesulfonyl)methane. Even more
preferable examples include at least one compound
5 selected from lithium bis(trifluoromethanesulfonyl)imide
and lithium tris(trifluoromethanesulfonyl)methane.
Especially preferable is lithium
tris(trifluoromethanesulfonyl)methane.

By mixing the Component (C2-4) of the present
10 invention in the composition of the present invention,
charge controlling property can be further improved, and
sustainability of the charge controlling property can be
expressed. When mixing the Component (C2-4), the
Component (C2-4) can be simply mixed as it is, or the
15 Component (C2-4) may be dissolved in a solvent (including
water) and then mixed. Further, the Component (C2-4) may
be used as a master batch in which it is dispersed at a
high concentration in a polymer in advance.

Especially preferable solvents in which the
20 Component (C2-4) is dissolved are water or a compound
represented by the below general formula (XVII).



(In the general formula (XVII), X represents an alkylene
group having from 2 to 8 carbon atoms, a divalent

hydrocarbon group containing an aromatic group, or a
divalent alicyclic hydrocarbon group; R independently
represents a linear or branched alkyl group having 1 to 9
carbon atoms; A independently represents an alkylene
5 group having 2 to 4 carbon atoms; and n independently
denotes an integer of from 1 to 7.)

Preferable examples of the compounds represented by
general formula (XVII) include compounds wherein R is an
alkyl group which does not have a hydroxyl group on the
10 terminal thereof. Especially preferable are bis[2-(2-
butoxyethoxy)ethyl]adipate (dibutoxyethoxyethyl adipate)
or bis(2-butoxyethyl)phthalate.

In the case of dissolving the Component (C2-4) of
the present invention, the concentration is in a range of
15 preferably 0.1 to 80% by mass, and more preferably 1 to
60% by mass.

Further, in the case of forming a master batch by
dispersing the Component (C2-4) at a high concentration
in a polymer in advance, a preferable method is to
20 produce the batch by mixing the Component (C2-4) with a
known polymer and optionally a solvent, and then melt
kneading the resulting mixture.

The known polymer used here is especially preferably
polymers which have an ether bond, such as
25 polyalkyleneoxide and/or a polyalkyleneoxide-containing
polymer. Specific examples include polyethyleneoxide,
polypropyleneoxide, polytetramethyleneoxide, and block

copolymers consisting of polyamide, polyester and the above mentioned polyalkyleneoxide. In addition, the Component (C1) of the present invention in which a polyether is used as the hydrophilic polymer block (c1-2) can also be used as the polymer having an ether bond. Therefore, the Component (C2-4) of the present invention may be contained in the Component (C1), or may be contained in another component of the present invention.

In the case of forming a master batch of the Component (C2-4) of the present invention, the Component (C2-4) content is preferably in a range of 0.5 to 80% by mass, more preferably 1 to 60% by mass, and especially preferably 3 to 40% by mass.

Solutions of the Component (C2-4) of the present invention is available as SANKONOL 0862-20R, 0862-13T, 0862-10T, AQ-50T or the like (trade names) manufactured by Sanko Chemical Industry Co., Ltd. The Component (C2-4) is available as a master batch namely SANKONOL TBX-25 or the like (trade name) also manufactured by Sanko Chemical Industry Co., Ltd.

In the first thermoplastic resin composition of the present invention, Component (C2-4) can be used in a range of preferably 0.001 to 60 parts by mass, more preferably 0.005 to 50 parts by mass, even more preferably 0.01 to 40 parts by mass, still even more preferably 0.05 to 25 parts by mass, especially preferably 0.05 to 15 parts by mass, and most preferably

0.1 to 10 parts by mass, based on 100 parts by mass of the total of Component (A) and Component (B). When the addition amount is less than 0.001 parts by mass, charge controlling property is not improved. When the addition
5 amount exceeds 60 parts by mass, sustainability of the charge controlling property and impact resistance deteriorate.

In the second and third thermoplastic resin compositions of the present invention, Component (C2-4)
10 can be used in a range of preferably 0.001 to 60 parts by mass, more preferably 0.005 to 50 parts by mass, even more preferably 0.01 to 40 parts by mass, still even more preferably 0.05 to 25 parts by mass, especially preferably 0.05 to 15 parts by mass, and most preferably
15 0.1 to 10 parts by mass, based on 100 parts by mass of Component (B). When the addition amount is less than 0.001 parts by mass, charge controlling property is not improved. When the addition amount exceeds 60 parts by mass, sustainability of the charge controlling property
20 and impact resistance deteriorate.

For the purpose of improving impact resistance, chemical resistance or surface appearance of molded articles, or further improving antistatic property or charge controlling property, the first and second
25 thermoplastic resin compositions of the present invention may comprise, in addition to the Components (A), (B), and (C1), at least one component selected from the group

consisting of the following Component (D), Component (E), Component (F), and Component (G).

For the purpose of improving impact resistance, chemical resistance, surface appearance of molded
5 articles, or further improving antistatic property or charge controlling property, the third thermoplastic resin composition of the present invention may comprise the following Component (D) as an essential component, and may comprise, as desired, at least one component
10 selected from the group consisting of the following Components (E), (F), and (G), wherein:

Component (D): at least one polymer selected from the group consisting of a block copolymer (D-a) comprising a polymer block (d-1) mainly consisting of an
15 aromatic vinyl compound and a polymer block (d-2) mainly consisting of a conjugated diene compound, and a hydrogenated product (D-b) thereof;

Component (E): a graft polymer resulting from (co)polymerization of an aromatic vinyl compound or an
20 aromatic vinyl compound and another vinyl monomer copolymerizable with the aromatic vinyl compound in a presence of the Component (D);

Component (F): an aromatic polycarbonate block copolymer consisting of a polymer block (f-1) consists of
25 the Component (D), and an aromatic carbonate polymer block (f-2); and

Component (G): a low molecular weight polyolefin modified with an unsaturated acid and/or unsaturated acid anhydride.

The Component (D), Component (E), Component (F), and
5 Component (G) can also be used together with at least one selected from the group consisting of the Component (C2-1), Component (C2-2), Component (C2-3), and Component (C2-4).

(5) Component (D)

10 Component (D) of the present invention is a block copolymer (D-a) comprising a polymer block (d-1) mainly consisting of an aromatic vinyl compound and a polymer block (d-2) mainly consisting of a conjugated diene compound, and/or a hydrogenated product (D-b) thereof.
15 The hydrogenated product (D-b) is a compound in which at least a part of the carbon-carbon double bonds of the conjugated diene compound of the block (d-2) is hydrogenated.

Examples of the aromatic vinyl compound which can be
20 used here include all of those mentioned above, among which styrene and α -methylstyrene are preferable, and styrene is especially preferable.

Examples of the conjugated diene compound include butadiene, isoprene, hexadiene, 2,3-dimethyl-1,3-
25 butadiene, 1,3-pentadiene and the like. Preferable are butadiene and isoprene. These may be used alone or in combination of two or more. Further, the block (d-2) may

comprise two or more different conjugated diene compounds which may be bonded in a random, block or tapered block form. The block (d-2) may also comprise from 1 to 10 tapered blocks in which the content of the aromatic vinyl compound gradually increases, or may also be a copolymer which comprises polymer blocks different in content of vinyl bonds derived from the conjugated diene compound of block (d-2).

A preferable structure of Component (D) of the present invention is the polymer represented by the below formulae (XVIII) to (XX), or hydrogenated product thereof.



In the structural formulae (XVIII) to (XX), A represents a polymer block having an aromatic vinyl compound as a main component, and may partially comprise a conjugated diene compound as long as it is essentially composed of an aromatic vinyl compound. Preferably, A is a polymer block comprising no less than 90% by mass, and more preferably no less than 99% by mass of the aromatic vinyl compound. B represents a homopolymer of a conjugated diene compound, or a copolymer of a conjugated diene compound with another monomer such as an aromatic vinyl compound. X represents a residue of a coupling agent, Y denotes an integer of from 1 to 5, and Z denotes an integer of from 1 to 5.

The ratio of the aromatic vinyl compound to the conjugated diene compound to be used in Component (D) of the present invention is preferably in a range of aromatic vinyl compound/conjugated diene compound = 10-
5 70/30-90% by mass, more preferably 15-65/35-85% by mass, and especially preferably 20-60/40-80% by mass.

The block copolymer consisting of an aromatic vinyl compound and a conjugated diene compound is a known substance in the technical field of anionic
10 polymerization. Examples include those disclosed in Japanese Patent Publication (Kokoku) No. S47-28915, Japanese Patent Publication (Kokoku) No. S47-3252, Japanese Patent Publication (Kokoku) No. S48-2423, and Japanese Patent Publication (Kokoku) No. S48-20038. A
15 production method for a polymer block having a tapered block is disclosed in Japanese Patent Laid-Open (Kokai) No. S60-81217.

The content of the vinyl bonds (1,2- and 3,4-bonds) derived from the conjugated diene compound of Component
20 (D) of the present invention is preferably in a range of 5 to 80%. The number average molecular weight of Component (D) of the present invention is preferably 10,000 to 1,000,000, more preferably 20,000 to 500,000, and especially preferably 20,000 to 200,000. Among these,
25 the number average molecular weight of the A portion is preferably in a range of 3,000 to 150,000, and the number average molecular weight of the B portion is preferably

in a range of 5,000 to 200,000, in the formulae (XVIII) to (XX).

Regulation of the vinyl bond content of the conjugated diene compound can be performed using amines
5 such as N,N,N',N'-tetramethylethylenediamine, trimethylamine, triethylamine, diazocyclo(2,2,2)octane and the like, ethers such as tetrahydrofuran, diethylene glycol dimethylether, diethylene glycol dibutylether and the like, thioethers, phosphines, phosphoamides,
10 alkylbenzene sulfonates, alkoxides of potassium and sodium, and the like.

Another preferable example of Component (D) of the present invention includes a polymer which is obtained by the above method and is treated with a coupling agent so
15 that it has a polymer chain extended or branched via a residue of the coupling agent. Examples of the coupling agent which can be used here include diethyl adipate, divinylbenzene, methyldichlorosilane, silicon tetrachloride, silicon butyltrichloride, tin
20 tetrachloride, tin butyltrichloride, silicon dimethylchloride, germanium tetrachloride, 1,2-dibromoethane, 1,4-chloromethylbenzene, bis(trichlorosilyl)ethane, epoxidized linseed oil, tolylene diisocyanate, 1,2,4-benzene triisocyanate and
25 the like.

Among the above block copolymers, those preferred from the viewpoint of impact resistance are polymers

which comprise from 1 to 10 tapered blocks in which aromatic vinyl compounds gradually increase, and/or radial block type ones which have been subjected to a coupling treatment.

5 Further, as Component (D), also can be used those in which the carbon-carbon double bonds of the conjugated diene portions of the block copolymer have been partially or completely hydrogenated. Preferable examples of Component (D) include those having a hydrogenation rate
10 of 10 to 100%, and more preferably 50 to 100%. From the viewpoint of weatherability (light resistance) of the obtained composition, those having a hydrogenation rate of no less than 90% are preferably used. From the
15 viewpoint of low-temperature impact resistance, those having a hydrogenation rate of 50% or more, but less than 90% are preferably used.

 Hydrogenation reaction of the polymer which is obtained by the method and comprises a polymer block mainly consisting of an aromatic vinyl compound unit and
20 a polymer block mainly consisting of a conjugated diene compound, can be performed by known methods. Also, a desired polymer can be obtained by regulating the hydrogenation rate by known methods. Specific methods include those disclosed in Japanese Patent Publication
25 (Kokoku) No. S42-8704, Japanese Patent Publication (Kokoku) No. S43-6636, Japanese Patent Publication (Kokoku) No. S63-4841, Japanese Patent Publication

(Kokoku) No. S63-5401, Japanese Patent Laid-Open (Kokai) No. H02-133406, and Japanese Patent Laid-Open (Kokai) No. H01-297413.

In the first thermoplastic resin composition of the present invention, the addition amount of Component (D) is in a range of preferably 1 to 200 parts by mass, more preferably 5 to 170 parts by mass, even more preferably 10 to 170 parts by mass, and especially preferably 15 to 150 parts by mass, based on 100 parts by mass of the total of Component (A) and Component (B). Within this range, a molded article with especially excellent impact resistance and chemical resistance can be obtained.

In the second thermoplastic resin composition of the present invention, the addition amount of Component (D) is in a range of preferably 1 to 200 parts by mass, more preferably 5 to 170 parts by mass, even more preferably 10 to 170 parts by mass, and especially preferably 15 to 150 parts by mass, based on 100 parts by mass of Component (B). Within this range, a molded article with especially excellent impact resistance and chemical resistance can be obtained.

In the third thermoplastic resin composition of the present invention, the addition amount of Component (D) is in a range of preferably 1 to 40% by mass, more preferably 5 to 40% by mass, even more preferably 5 to 35% by mass, and especially preferably 10 to 35% by mass, based on 100 parts by mass of the total of Component (B),

Component (C1) and Component (D). When the addition amount is less than 1% by mass, improvement in charge controlling property is inferior, and when it is more than 40% by mass, chemical resistance and surface
5 appearance of molded articles deteriorate.

(6) Component (E)

Component (E) of the present invention is a graft (co)polymer resulting from (co)polymerization of an aromatic vinyl compound or an aromatic vinyl compound and
10 another vinyl monomer copolymerizable with the aromatic vinyl compound in the presence of the Component (D). Examples of aromatic vinyl compounds, and of the another vinyl monomer copolymerizable with the aromatic vinyl compound, used here include all of those described above
15 for the vinyl monomer (b) of Component (A). Especially preferable combinations are styrene/acrylonitrile and styrene/acrylonitrile/methyl methacrylate.

Further, as the Component (D) which can be used here, all of those described above can be used, and preferable
20 are those in which carbon-carbon double bonds of the conjugated diene compound units are hydrogenated. More preferable are those in which no less than 90% of the carbon-carbon double bonds of the conjugated diene compound units are hydrogenated, and especially
25 preferable are those in which no less than 95% of them are hydrogenated.

Component (E) of the present invention is obtained by graft polymerization of the above monomer components in the presence of Component (D). The Component (E) comprises 10 to 60% by mass of Component (D), and has a
5 graft ratio of preferably 20 to 80% by mass.

Such a polymer can be produced by the polymerization methods described above concerning Component (A), i.e. solution polymerization, bulk polymerization, and suspension polymerization, as well as a combination
10 thereof. A graft polymer obtained in such a manner will usually contain a copolymer in which the monomer component is graft-copolymerized to the Component (D), and a non-grafted component ((co)polymer of the monomer components with each other) which consists of the monomer
15 components that are not grafted to the rubber-like polymer.

In the first thermoplastic resin composition of the present invention, the addition amount of Component (E) is in a range of preferably 1 to 200 parts by mass, more
20 preferably 5 to 170 parts by mass, even more preferably 10 to 170 parts by mass, and especially preferably 15 to 150 parts by mass, based on 100 parts by mass of the total of Component (A) and Component (B). Within this range, a molded article with especially excellent impact
25 resistance can be obtained.

(7) Component (F)

Component (F) of the present invention is an aromatic polycarbonate block copolymer which comprises a polymer block (f-1) consisting of the Component (D), and
5 an aromatic carbonate polymer block (f-2). Here, the molecule terminals of the Component (D) preferably have a functional group that is reactive with an aromatic polycarbonate. Examples of this functional group include a hydroxyl group, a carboxyl group, an epoxy group, an
10 isocyanate group and the like. Preferable examples include a hydroxyl group and a carboxyl group, and especially preferable is a hydroxyl group. These functional groups are preferably added to a molecule terminal of the aromatic vinyl compound block (d-1).
15 Such functional groups may be bound to both or one of the terminals of Component (D), but it is preferable from the viewpoint of impact resistance that the functional group is bound to just one of the terminals. In addition, all the molecules do not have to possess the functional group,
20 but preferably 0.5 or more, more preferably 0.7 to 2.0 functional groups may be present on average per molecule.

Known methods can be used for introducing functional groups to molecular terminals. Examples thereof include a method wherein an aromatic vinyl compound and a
25 conjugated diene compound are polymerized in the presence of an organic alkali metal compound, and a compound having a functional group is allowed to react with an

active site of the obtained polymer; a method in which ethylene oxide or propylene oxide is added to a terminal of the block copolymer, and then adding an active hydrogen compound such as alcohols, carboxylic acids, water and the like, whereby anionic polymerization is terminated to introduce a hydroxyl group to the terminal; and a method in which carbon dioxide gas is bubbled at a low temperature whereby anionic polymerization is terminated to introduce a carboxyl group to a terminal.

10 The Component (D) comprising a functional group at a molecular terminal is preferably one in which carbon-carbon double bonds of the conjugated diene compound units are hydrogenated by a known method. Hydrogenation can be conducted using the known methods described above
15 concerning Component (D).

Block (f-2) is an aromatic polycarbonate which includes all that can be obtained by known methods, including those obtained by interfacial polycondensation of various hydroxyaryl compounds and phosgene; those
20 obtained by transesterification (melt polycondensation) of a dihydroxyaryl compound and a carbonate compound such as diphenylcarbonate; and the like.

Examples of dihydroxyaryl compounds which serve as a raw material for the aromatic polycarbonate include
25 bisphenol A, hydroquinone, 2,2-bis(4-hydroxyphenyl)pentane, 2,4-dihydroxydiphenylmethane,

bis(2-hydroxyphenyl)methane, bis(4-hydroxyphenyl)methane and the like. Bisphenol A is especially preferable.

Viscosity average molecular weight of the aromatic polycarbonate used in the present invention is preferably
5 8,000 to 50,000, more preferably 12,000 to 30,000, and especially preferably 15,000 to 26,000. Those different in viscosity average molecular weights may be used together as appropriate.

The viscosity average molecular weight of the
10 aromatic polycarbonate can be calculated by inputting into the following equation (3) the specific viscosity $[\eta_{sp}]$ which is measured by using methylene chloride as solvent at 20°C and a concentration of 0.7 g/100 ml (methylene chloride).

15 Viscosity average molecular weight = $([\eta] \times 8,130)^{1.205} \dots (3)$
Here, $[\eta] = [(\eta_{sp} \times 1.12 + 1)^{1/2} - 1] / 0.56 C$
(C representing concentration).

Component (F) of the present invention comprises a block (f-1) which is a functional group-modified product
20 of Component (D) in which the functional group is introduced at the terminal as described above, and an aromatic polycarbonate polymer block (f-2). Component (F) can be produced by, for example, (i) a method in which the block (f-1) and the block (f-2) are melt-
25 kneaded; (ii) a method in which the block (f-2) is polymerized in the presence of the block (f-1); and (iii) a method in which the block (f-1) is added at the final

stage of polymerization of the block (f-2) to effect a reaction. The industrially preferable method is the method (i).

The mass ratio of the Component (D)/Component (f-2)
5 in Component (F) is preferably a range of 95/5/ to 5/95, more preferably 80/20 to 20/80 and especially preferably 70/30 to 30/70.

It is not necessary that all the Component (D) and the Component (f-2) of the present invention form block
10 copolymers. The object of the present invention can be achieved as long as at least 10% by mass or more of them form block copolymers.

Such block copolymer mixtures can be produced by the methods disclosed in, for example, Japanese Patent Laid-
15 Open (Kokai) No. 2001-220506. Component (F) of the present invention is also commercially available as the TM polymer series TM-S4L77, TM-H4L77 (trade names) manufactured by Kuraray Co., Ltd.

In the first thermoplastic resin composition of the
20 present invention, Component (F) is preferably used in a range of 1 to 200 parts by mass, more preferably 5 to 170 parts by mass, even more preferably 10 to 170 parts by mass, and especially preferably 15 to 150 parts by mass, based on 100 parts by mass of the total of Component (A)
25 and Component (B). Within this range, a molded article with especially excellent impact resistance can be obtained.

(8) Component (G)

Component (G) of the present invention is a low molecular weight polyolefin modified with an unsaturated acid and/or unsaturated acid anhydride. Examples of the low molecular weight polyolefin used here include the low molecular weight polymers of the Component (B) of the present invention. Among these, low molecular weight polypropylene or low molecular weight polyethylene are preferable.

The weight average molecular weight of the low molecular weight polyolefin is preferably 1,000 to 100,000, more preferably 5,000 to 60,000, and especially preferably 8,000 to 50,000. The low molecular weight polyolefin can be obtained by polymerization or thermal degradation of a high molecular weight polyolefin. Those obtained by thermal degradation are preferable because they are readily modified with an unsaturated acid and/or unsaturated acid anhydride. Low molecular weight polyolefins resulting from thermal degradation can be obtained by, for example, subjecting a high molecular weight polyolefin to thermal degradation in an inert gas, usually at 300 to 450°C for 0.5 to 10 hours (in accordance with the method described in Japanese Patent Laid-Open (Kokai) No. H03-62804, for example).

Examples of the unsaturated acid used here include acrylic acid, methacrylic acid, crotonic acid, cinnamic acid, itaconic acid, maleic acid and the like, which may

be used alone or in combination of two or more. Examples of the unsaturated acid anhydride include maleic anhydride, itaconic anhydride, chloroitaconic anhydride, chloromaleic anhydride, citraconic anhydride and the like, which may be used alone or in combination of two or more. Maleic anhydride is preferable.

Component (G) of the present invention is one which has been modified with the unsaturated acid and/or unsaturated acid anhydride in an amount of preferably 0.5 to 25% by mass, more preferably 1 to 20% by mass, and especially preferably 3 to 15% by mass based on 100% by mass of the low molecular weight polyolefin. Component (G) can be obtained, for example, by modifying a low molecular weight polyolefin with the unsaturated acid and/or unsaturated acid anhydride by means of a solution method, a melting method or the like, if necessary, in the presence of an organic peroxide. Materials corresponding to Component (G) of the present invention are commercially available as, for example, YUMEX 1001, 1003, 1010, 100TS, 110TS, 2000, CA60 and the like (trade names) manufactured by Sanyo Chemical Industries, Ltd.

In the first thermoplastic resin composition of the present invention, Component (G) is used in a range of preferably 1 to 200 parts by mass, more preferably 1 to 50 parts by mass, even more preferably 1 to 45 parts by mass, and especially preferably 2 to 40 parts by mass based on 100 parts by mass of the total of Component (A)

and Component (B). When the addition amount is less than 1 part by mass, antistatic property deteriorates, and when it is more than 50 parts by mass, impact resistance and antistatic property deteriorate.

5 Components (D), (E), (F) and (G) of the present invention are ingredients effective for improving compatibility among the components of the present thermoplastic resin composition and improving various other properties thereof. They can be used alone or in
10 combination of two or more selected from these respective components. When two or more selected from the Components (D), (E), (F) and (G) are used in combination, the total content of these components is in a range of preferably 1 to 200 parts by mass, more preferably 5 to
15 150 parts by mass, and especially preferably 5 to 100 parts by mass based on 100 parts by mass of the total of Component (A) and Component (B).

 If the thermoplastic resin composition according to the present invention comprises an olefin polymer as a
20 main component, blending the Component (D) therewith is preferable because this increases compatibility among the components of the composition and enhances impact resistance, chemical resistance, surface appearance of molded articles and antistatic property or charge
25 controlling property generally. Use of Component (D) and Component (G) in combination is even more preferable

because the above-mentioned respective properties are improved still further.

Here, the case of "comprising an olefin polymer as a main component" refers to the situation where the thermoplastic resin composition of the present invention satisfies the equation:

$$\{(B)+(C1)\}/\{(A)+(B)+(C1)\}\geq 0.4,$$

wherein (A), (B) and (C1) represent contents (on mass basis) of Component (A), Component (B) and Component (C1), respectively.

Further, if the thermoplastic resin composition of the present invention comprises a styrene polymer as a main component, blending of Component (E) and/or Component (F) is preferable because antistatic property or charge controlling property is improved.

Here, the case of "comprising a styrene polymer as a main component" refers to the situation where the thermoplastic resin composition of the present invention satisfies the equation:

$$\{(B)+(C1)\}/\{(A)+(B)+(C1)\}< 0.4,$$

wherein (A), (B) and (C1) represent contents (on mass basis) of Component (A), Component (B) and Component (C1), respectively.

The thermoplastic resin composition of the present invention can be prepared by mixing the respective components by means of melt-kneading with various types of extruder, Banbury mixer, kneader, continuous kneader

and the like. A preferable production method is a method which uses an extruder, and an especially preferable method is a method which uses a multi-screw extruder or uses a combination of an extruder with a Banbury mixer,
5 continuous kneader or the like.

When the respective components are mixed together, the components may be mixed all together or may be mixed in several stages or in several portions.

The thermoplastic resin composition of the present
10 invention may be further mixed with known inorganic or organic fillers. Examples of inorganic fillers used here include glass fiber, glass flakes, milled glass fiber, glass beads, hollow glass, carbon fiber, milled carbon fiber, talc, calcium carbonate, calcium carbonate whisker,
15 wollastonite, mica, kaolin, montmorillonite, hectorite, zinc oxide whisker, potassium titanate whisker, aluminum borate whisker, plate alumina, plate silica, and organically-modified smectite, aramid fiber, phenolic resin fiber, polyesterresin fiber and the like. These
20 can be used alone or in combination of two or more.

For the purpose of improving dispersibility of fillers, those treated with a known coupling agent, surface treatment agent, sizing agent and the like, can be used. Examples of known coupling agents include
25 silane coupling agents, titanate coupling agents, aluminum coupling agents and the like.

The inorganic or organic fillers can be used in a range of usually 1 to 200 parts by mass, and preferably 1 to 100 parts by mass based on 100 parts by mass of the thermoplastic resin composition of the present invention,.

5 The thermoplastic resin composition of the present invention may also be mixed with known weather- (light-) resistant agents, antistatic agents, antioxidants, lubricants, plasticizers, coloring agents, dyes, crystal nucleating agents, antibacterial agents, fungicides,
10 foaming agents, flame retardants (phosphorus-containing flame retardants, nitrogen-containing flame retardants, halogen-containing flame retardants and silicone-containing flame retardants), and flame retardant aids (antimony oxide compounds, PRFE etc., chlorinated
15 polyethylene) and the like.

 The thermoplastic resin composition of the present invention may also be appropriately mixed with other known polymers such as polyamide resins, polyester resins, PMMA, copolymers of methyl methacrylate with maleimide
20 compound, polyphenylene ethers, polyoxymethylene, polyphenylene sulfides, epoxy resins, phenolic resins, EVA, EVOH, ENE, LCP, thermoplastic polyurethanes, aromatic polycarbonates, urea resins, phenoxy resins and the like.

25 The thus-prepared thermoplastic resin composition of the present invention can be formed into molded articles by known molding methods such as injection molding, press

molding, sheet forming, film forming, vacuum molding, profile extrusion molding, foaming molding and the like. Further, by use of multilayer extrusion molding, molded articles can be obtained, which comprise a surface layer
5 made of the thermoplastic resin composition of the present invention, and a back or intermediate layer made of a polyolefin or styrene resin. In addition, the resulting multilayer sheet can be processed into a desired molded article by vacuum molding. Examples of
10 molded articles which can be obtained by these molding methods include the following:

Electrical and electronic parts exemplified by various gears, various casings, sensors, LEP lamps, connectors, sockets, resistors, relay cases, wafer cases,
15 IC trays, liquid-crystal trays, switches, coil bobbins, capacitors, variable capacitor cases, optical pick-up parts, oscillators, various terminal boards, transformers, plugs, printed wiring boards, tuners, speakers, microphones, headphones, small motors, magnetic head
20 bases, power modules, housings, semiconductors, liquid crystal FDD carriages, FDD chassis, motor brush holders, parabolic antennae, computer related parts and the like; parts of home or office electrical products exemplified by VTR parts, television parts, irons, hair dryers, rice
25 cookers, microwave ovens, audio parts, parts of audio equipment such as audio laser discsTM and compact discs, lighting parts, refrigerator parts and the like; office

computer-related parts, telephone-related parts,
facsimile-related parts, copier-related parts, and
washing tool-related parts; sanitary parts such as toilet
seats, tank covers, casings, kitchen peripheral parts,
5 washstand-related parts, bathroom-related parts and the
like; home or building related parts such as window
frames, furniture, flooring materials, wall materials and
the like; parts for optical or precision instruments
exemplified by microscopes, binoculars, cameras, watches
10 and the like; alternator terminals, alternator
connectors, IC regulators, exhaust gas valves and other
valves, various valves related to fuel, exhaust system
and intake system; air intake nozzle snorkels, intake
manifolds, fuel pumps, engine coolant joints, carburetor
15 main bodies, carburetor spacers, exhaust gas sensors,
coolant sensors, oil temperature sensors, brake pad wear
sensors, throttle position sensors, crankshaft position
sensors, air flow meters, air conditioner thermostat
bases, heating warm air flow control valves, radiator
20 motor brush holders, water pump impellers, turbine vanes,
wiper motor-related parts, distributors, starter switches,
starter relays, transmission wire harnesses, window
washer nozzles, air conditioner panel switch boards, coil
bobbins for fuel solenoid valves, fuse connectors, horn
25 terminals, insulating boards for electric parts, step
motor rotors, lamp sockets, lamp reflectors, lamp
 housings, brake pistons, solenoid bobbins, engine oil

filters, ignition system cases; personal computers, printers, displays, CRT displays, laptop computers, mobile phones, PHS (personal handy phones), housings for storage devices such as DVD drives, PD drives, flexible
5 disk drives and the like; electrical and electronic parts such as chassis, relays, switches, casing members, transformer members, coil bobbins and the like; vehicle exterior parts such as bumpers, fenders and the like; and various other applications.

10 When the thermoplastic resin composition of the present invention is processed into a sheet or a film, it preferably has a thickness of 10 μm to 100 mm.

 The sheet or film may be a single layer sheet or film, or may be a multilayer molded article in which the
15 sheet or film is laminated onto at least one of the surfaces of a substrate. In addition, a pressure-sensitive adhesive or the like may be layered on the sheet or film. Also, a known gas barrier film may be layered on the sheet or film.

20 When a multilayer sheet or film is formed of the thermoplastic resin composition of the present invention, the thermoplastic resin composition of the present invention may be processed into a two-layer sheet or film together with a substrate, or a three-layer sheet or film
25 together with a substrate that forms an intermediate layer. Examples of the substrate used here include sheets or films made of known polymers. Among them, a

sheet or film made of Component (A) or Component (B) of the present invention can be preferably used. Especially preferable is a sheet or film made of an olefin resin. For the purpose of improving rigidity and heat resistance,
5 sheets or films which contain inorganic or organic fillers can also be used.

In the multilayer sheet, the thermoplastic resin composition of the present invention has a thickness of preferably no less than 10 μm , more preferably no less
10 than 50 μm , and especially preferably no less than 80 μm for the purpose of stably expressing charge controlling property. Especially preferable methods for obtaining such a multilayer sheet or film are coextrusion with a T-die, and coextrusion with inflation. A sheet or film
15 thus obtained can be subjected to vacuum molding or the like to obtain a molded article such as trays, as required.

Figure 1 illustrates an example of a multilayer molded article according to the present invention, and is
20 a schematic cross-sectional view of a two-layer molded article 1 which is provided on only one surface of a substrate 11 with an antistatic layer 12 made of the thermoplastic resin composition of the present invention. Figure 2 illustrates another example of a multilayer
25 molded article according to the present invention, and is a schematic cross-sectional view of a three-layer molded article 2 which is provided on both surfaces of a

substrate 11 with antistatic layers 12a and 12b made of the thermoplastic resin composition of the present invention. The thickness of the antistatic layers 12a and 12b may be the same or different from each other. In addition, the composition of the antistatic layers 12a and 12b may be the same or different from each other.

In the case of producing a pressure-sensitive adhesive sheet or film, the surface of a substrate sheet or substrate film made of the thermoplastic resin composition of the present invention can be subjected to various known treatments such as corona discharge treatment, flame treatment, acid treatment, plasma treatment, UV treatment, ion bombardment treatment, solvent treatment and the like for the purpose of improving adhesion with a pressure-sensitive adhesive or a primer layer. Further, these treatments may, as necessary, be carried out in combination.

Furthermore, for the purpose of enhancing adhesion between a substrate sheet or film and a pressure-sensitive adhesive, a primer layer may be formed directly on the substrate sheet or film or on the above surface-treated surface thereof. Specifically, an extremely thin layer having a thickness of about 0.1 μm to 10 μm is formed by use of a resin such as polyethyleneimine, polyurethane, or an acrylic resin. Usually, the layer can be formed by coating a solution of the resin in a solvent (including water) and then drying.

The pressure-sensitive adhesive includes emulsion type one which can be coated by a screen method, a gravure method, a mesh method, a bar coating method or the like, organic solvent type one, and hot melt type one which is molded by extrusion laminating, dry laminating, coextrusion and the like. Any of these adhesives can be used. Further, the thickness of the pressure-sensitive adhesive is not especially defined, but usually is in a range of about 1 to 100 μm .

The thus-obtained molded article can be used in the fields of cases including relay cases, wafer cases, reticle cases, ask cases and the like; trays, including liquid crystal trays, chip trays, memory trays, CCD trays, IC trays and the like; carriers including IC carriers and the like; protective sheets for polarizing films; protective sheets used when cutting off polarizing films; films including protective films for liquid crystal display devices or plasma displays, protective films for semiconductor related items, protective films for clean rooms and the like; and the internal parts of automatic vending machines.

EXAMPLES

The present invention will now be described in further detail with reference to working examples, but it is to be understood that these examples do not limit the invention without departing from the gist of the present

invention. In the following examples, "parts" and "%" are on mass basis unless otherwise specified. Various evaluations in the Examples and Comparative Examples were made in the manner described below.

5 1. Evaluation Methods

(1) Gel content of the rubber-like polymer:

Carried out in accordance with the method described above.

(2) Average particle size of the rubber-like polymer
10 latex:

Average particle size of the rubber-like polymer latex used for preparing Component (A) was measured by a light scattering method. Measurement was carried out with an LPA-3100 (manufactured by Otsuka Electronics Co.,
15 Ltd.) using the cumulant method (70 times integration). The particle size of the grafted rubber-like polymer particles dispersed in Component (A) was confirmed with an electron microscope to be almost the same as that of the latex particles.

20 (3) Graft ratio of Component (A):

Carried out in accordance with the method described above.

(4) Limiting viscosity $[\eta]$ of the acetone soluble matter of Component (A):

25 Carried out in accordance with the method described above.

(5) Component (D) (bonded styrene content, vinyl bond content, number average molecular weight and hydrogenation rate of the polymer)

(5-1) Bonded styrene content

5 Measured using the polymer prior to hydrogenation. Determined from the calibration curve obtained by infrared study based on the absorption of phenyl groups at 699 cm^{-1} .

(5-2) Number average molecular weight

10 Measured using the polymer prior to hydrogenation. Determined from gel permeation chromatography (GPC).

(5-3) Vinyl bond content

Measured using the polymer prior to hydrogenation. Determined from infrared study (Morello method).

15 (5-4) Hydrogenation rate

Measured using the polymer after hydrogenation. Calculated from the spectrum decrease of unsaturated double bond compounds in the $100\text{ MHz } ^1\text{H-NMR}$ spectrum measured at a concentration of 15% using ethylene tetrachloride as a solvent.

(6) Impact resistance

(6-1) Impact resistance 1

Notched Charpy impact strength (KJ/m^2) was measured in accordance with ISO testing method 179.

25 (6-2) Impact resistance 2

Breaking energy ($\text{kgf}\cdot\text{cm}$) upon punching a 2.4 mm -thick flat plate placed on a receiving tray (38 mm in

diameter) with a 16 mm-diameter impact bar at a velocity of 2.4 m/sec was measured.

(6-3) Impact resistance-3

Breaking energy (kgf-cm) upon punching a 1.6 mm-
5 thick flat plate with a 1/2 inch-diameter impact bar having a tip R of 1/2 inch at a velocity of 2.0 m/sec was measured.

(7) Chemical resistance

(7-1) Chemical resistance A

10 1% strain was applied to a 3.2 mm-thick x 12.7 mm-wide x 127 mm-long test piece, and the following chemicals were applied thereto. After being left to stand at 23°C for 48 hours, the surface appearance of the molded article was evaluated based on the following
15 evaluation criteria.

O: no change

X: cracking or fracturing

(7-1-1) Chemical resistance A1: Ethanol

(7-1-2) Chemical resistance A2: Brake fluid

20 (7-2) Chemical resistance B

1% strain was applied to a test piece (127 mm-long x 12.7 mm-wide x 1 mm-thick), and ethanol (EtOH) or methyl ethyl ketone (MEK) was applied to the surface thereof. The test piece was then left to stand at 23°C for 72
25 hours. Then, the surface appearance of the test piece was evaluated by visual observation based on the following evaluation criteria.

O: no change

X: cracking or dissolving

(7-3) Chemical resistance C

Using a 1 mm-thick sheet as a test piece, 1% strain
5 was applied thereto, and the following chemicals were
then applied thereto. After being left to stand at 23°C
for 72 hours, the surface appearance of the sheet was
evaluated by visual observation based on the following
evaluation criteria.

10 O: no change

X: largely cracking, or fracturing

(7-3-1) Chemical resistance C1: Methanol

(7-3-2) Chemical resistance C2: Methyl ethyl ketone

(8) Antistatic resistance

15 (8-1) Antistatic resistance 1

A 2 mm-thick disk having a 100 mm-diameter was
formed, and after being conditioned for 7 days at 23°C
and a relative humidity of 50%, surface resistivity was
measured at an applied voltage of 500 V using an ultra-
20 insulation resistance meter MODEL "4329A" (manufactured
by Yokokawa Hewlett-Packard).

(8-2) Antistatic resistance 2

A 2 mm-thick disk having a 100 mm-diameter was
formed, and after being conditioned for 1 day at 23°C and
25 a relative humidity of 30%, surface resistivity was
measured at an applied voltage of 500 V using a High

Resistance Meter MODEL "4339B" manufactured by Agilent-Technologies.

(8-3) Antistatic resistance-3

A 2 mm-thick disk having a 100 mm-diameter was
5 formed, and after being conditioned for 1 day at 23°C and
a relative humidity of 50%, surface resistivity was
measured at an applied voltage of 500 V using a High
Resistance Meter MODEL "4339B" manufactured by Agilent-
Technologies.

10 (9) Charge controlling property

(9-1) Charge controlling property 1

Using a 1 mm-thick sheet which had been left for 24
hours at 23°C and 50% RH, surface resistivity was
measured at an applied voltage of 500 V using a
15 HIGHRESTER-UP MCP-HT450 manufactured by Mitsubishi
Chemical Corporation.

(9-2) Charge controlling property 2

Using a 1 mm-thick sheet which had been left for 24
hours at 23°C and 50% RH, surface resistivity (No. 1
20 surface resistivity) was measured at an applied voltage
of 100 V using a HIGHRESTER-UP MCP-HT450 manufactured by
Mitsubishi Chemical Corporation.

(10) Sustainability of charge controlling property

A 1 mm-thick sheet was dipped for 10 days in
25 distilled water, and then left in a constant-temperature
constant-humidity chamber at 23°C and 50% RH. The
surface resistivity at an equilibrium condition (No. 2

surface resistivity) was determined by measuring the change over time in surface resistivity using the method described in (9-2).

Sustainability was evaluated based on No. 1 surface resistivity and No. 2 surface resistivity in accordance with the following evaluation criteria.

○: No. 2 surface resistivity is equivalent to or lower than No. 1 surface resistivity, and thus sustainability is present.

10 X: No. 2 surface resistivity is poorer than No. 1 surface resistivity, and thus sustainability is poor.

(11) Surface appearance of molded article

(11-1) Surface appearance 1

Using a 3.2 mm-thick flat plate molded article, evaluation was carried out by visual observation based on the following criteria.

◎: Almost no sink marks occur, and surface condition of the molded article is smooth.

○: Some sink marks occur, but surface condition of the molded article is smooth and in a usable condition.

X: Large sink marks occur, and/or surface condition of the molded article is poor in smoothness and in a unusable condition.

(11-2) Surface appearance 2 (gloss)

25 A flat plate was formed. 60° gloss was measured using a gloss meter GM-26D manufactured by Murakami Color Research Laboratory Co., Ltd.

(11-4) Surface appearance 3

Evaluation was carried out on a multilayer sheet and a tray by visual observation based on the following criteria.

5 O: Surface is smooth, and shape is not skew.

X: Uneven portions appear on the surface, or shape is skew.

2. Thermoplastic resin composition components

(1) Component (A)

10 (1-1) Production example 1: ABS resin (A1)

In a glass flask having an internal volume of 7 liters and equipped with a stirrer under a nitrogen flow, were placed 75 parts of ion-exchange water, 0.5 part of potassium rosinate, 0.1 part of tert-dodecylmercaptan, 40
15 parts (solid matter) of polybutadiene latex (average particle size of 3,500Å, gel content of 85%), 15 parts of styrene, and 5 parts of acrylonitrile. The resultant mixture was then heated while stirring. When the internal temperature reached 45°C, the mixture was
20 supplemented with a solution in which 0.2 part of sodium pyrophosphate, 0.01 part of ferrous sulfate 7-hydrate, and 0.2 part of glucose were dissolved in 20 parts of ion exchange water. Next, the resultant mixture was supplemented with 0.07 part of cumene hydroperoxide to
25 start polymerization. After polymerizing for 1 hour, the mixture was further continuously supplemented over 3 hours with 50 parts of ion exchange water, 0.7 part of

potassium rosinate, 30 parts of styrene, 10 parts of acrylonitrile, 0.05 part of tert-dodecylmercaptan and 0.01 part of cumene hydroperoxide. Polymerization was further continued for 1 hour, and then 0.2 part of 2,2'-
5 methylene-bis(4-ethyl-6-tert-butylphenol) was added thereto to terminate polymerization. The latex of the reaction product was coagulated with aqueous sulfuric acid, washed with water, and then dried to obtain a styrene resin A1. The graft ratio of this A1 was 68%,
10 and the limiting viscosity $[\eta]$ of the acetone soluble matter thereof was 0.45 dl/g.

(1-2) Production example 2: AS resin (A2)

Two jacket-equipped polymerization reaction vessels having an internal volume of 30 liters and equipped with
15 a ribbon blade, were connected together and purged with nitrogen. To the first reaction vessel, 75 parts of styrene, 25 parts of acrylonitrile and 20 parts of toluene were continuously added. The first reaction vessel was continuously fed with a solution of 0.12 part
20 of tert-dodecylmercaptan and 5 parts of toluene as a molecular weight regulator, and a solution of 0.1 part of 1,1'-azobis(cyclohexane-1-carbonitrile) and 5 parts of toluene as a polymerization initiator. In the first vessel, the polymerization temperature was controlled at
25 110°C, the average retention time was 2.0 hours, and the polymerization conversion rate was 57%. The obtained polymer solution was fed into the second reaction vessel

by continuously extracting it with a pump provided outside the first reaction vessel in the same amount as the fed amounts of the styrene, acrylonitrile, toluene, molecular weight regulator and polymerization initiator.

5 In the second vessel, the polymerization temperature was at 130°C, and the polymerization conversion rate was 75%. The copolymer solution obtained from the second reaction vessel was fed to a twin-screw and 3-stage-vented extruder so as to directly vaporize unreacted monomers
10 and solvents, to obtain a styrene resin A2 having a limiting viscosity $[\eta]$ of 0.48 dl/g.

(1-3) Production example 3: AS resin (A3) copolymerized with a hydroxyl group-containing unsaturated compound

Polymerization was carried out in the same manner as
15 in Production example 1, except that polybutadiene used in Production example 1 was not used; potassium dodecylbenzenesulfonate was used in place of potassium rosinatate; as the first stage monomer components, the styrene/acrylonitrile/2-hydroxyethyl methacrylate in the
20 ratio of 22.5/7.5/3.5 parts were used; and as the continuously fed components, the styrene/acrylonitrile/2-hydroxyethyl methacrylate in the ratio of 44.7/14.9/6.9 parts were used. The latex of the reaction product was
25 washed with water, and then dried, to obtain a styrene resin A3. The limiting viscosity $[\eta]$ of this was 0.44.

(1-4) Production example 4: AS resin (A4) copolymerized with a carboxyl group-containing unsaturated compound

Polymerization was carried out in the same manner as in Production example 1, except that the first stage
5 monomer components in Production example 3 were changed to the styrene/acrylonitrile/methacrylic acid in the ratio of 23.7/7.9/1.7 parts; and the continuously fed components were changed to a styrene/acrylonitrile/methacrylic acid in the ratio of
10 47.5/15.8/3.4 parts. A styrene resin (A4) was obtained, which had a limiting viscosity $[\eta]$ of 0.46.

(1-5) Production example 5: AS resin (A5) copolymerized with an epoxy group-containing unsaturated compound

Polymerization was carried out in the same manner as
15 in Production example 1, except that the first stage monomer components in Production example 3 were changed to the styrene/acrylonitrile/glycidyl methacrylate in the ratio of 23.7/7.9/1.7 parts; and the continuously fed components were changed to the
20 styrene/acrylonitrile/glycidyl methacrylate in the ratio of 47.5/15.8/3.4 parts. A styrene resin (A5) was obtained, which had a limiting viscosity $[\eta]$ of 0.42.

(2) Component (B)

(2-1) B1: Polypropylene resin

25 A block-type polypropylene "NOVATEC BC6C" (trade name) manufactured by Japan Polychem Corporation was used.

(2-2) B2: Polypropylene resin

A homo-type polypropylene "NOVATEC MA1" (trade name) manufactured by Japan Polychem Corporation was used.

(2-3) B3: Polypropylene resin

5 A homo-type polypropylene "NOVATEC FY6C" (trade name) manufactured by Japan Polychem Corporation was used.

(3) Component (C1)

C1-1: A polypropylene-polyether block copolymer "PELESTAT 303" (trade name) manufactured by Sanyo Chemical Industries, Ltd., was used.

10 C1-2: A polyethylene-polyether block copolymer "PELESTAT 230" (trade name) manufactured by Sanyo Chemical Industries, Ltd., was used.

(4) Component (C2-1)

15 C2-1-1: A polyether-polyamide "PELESTAT M-140" (trade name) manufactured by Sanyo Chemical Industries, Ltd., was used.

C2-1-2: A polyether-polyester "TEP-004" (trade name) manufactured by Takemoto Oil & Fat Co., Ltd., was used.

(5) Component (C2-2)

20 The following nonionic antistatic agents manufactured by Kao Corporation were used as Component (C2-2) of the present invention.

C2-2-1: ELECTROSTRIPPER-TS-5 (trade name): a glycerin ester antistatic agent.

25 C2-2-2: ELECTROSTRIPPER-EA (trade name): a diethanolamine antistatic agent.

C2-2-3: ELECTROSTRIPPER-TS-3B (trade name): a glycerin ester/diethanolamine combined antistatic agent.

(6) Component (C2-3)

"HIGH BORON MB400N-8LDPE" (trade name) manufactured
5 by Boron International Co., Ltd., was used as the
Component (C2-3) of the present invention. This product
is a polyethylene master batch of "HIGH BORON 400N"
(trade name) which is a polymeric charge transfer type
conjugate manufactured by the same company, wherein the
10 active ingredient as Component (C2-3) is 7%.

(7) Component (C2-4)

The following was used as Component (C2-4) of the
present invention.

C2-4-1: SANKONOL 0862-10T (trade name) manufactured by
15 Sanko Chemical Industry Co., Ltd.; 10% lithium salt
content.

C2-4-2: SANKONOL AQ-50T (trade name) manufactured by
Sanko Chemical Industry Co., Ltd.; 50% lithium salt
content.

20 C2-4-3: Lithium bromide.

(8) Component (D)

(8-1) Production example 6: Partially hydrogenated
styrene-butadiene-styrene block copolymer

A jacketed autoclave equipped with a stirrer was
25 dried and purged with nitrogen. To the autoclave, was
then added a cyclohexane solution containing 30 parts of
styrene. Next, n-butyllithium was added, and the

resultant mixture was polymerized at 70°C for 1 hour. Then, a cyclohexane solution containing 40 parts of butadiene was added, and the resultant mixture was polymerized for 1 hour. Part of the obtained block
5 polymer solution was taken as a sample. 0.3 part of 2,6-di-tert-butylcatechol was added to 100 parts of the block copolymer. Solvent was subsequently removed by heating. The resultant product had a styrene content of 60% and a 1,2-vinyl bond content of the polybutadiene portion of
10 35%. Number average molecular weight thereof was 74,000. The remaining block copolymer solution was supplemented with a solution of titanocenedichloride and triethylaluminum which had been reacted in cyclohexane. Hydrogenation was then carried out for 40 minutes at 50°C
15 under a hydrogen pressure of 50 kgf/cm². 0.3 part of 2,6-di-tert-butylcatechol was added to 100 parts of the block copolymer. Solvent was subsequently removed, whereby a polymer D1 was obtained having a hydrogenation rate of 69%.

20 (8-2) Production example 7: Completely hydrogenated styrene-butadiene-styrene block copolymer

A jacketed autoclave equipped with a stirrer was dried and purged with nitrogen. To the autoclave, were then added cyclohexane and 20 parts of butadiene. Next,
25 0.025 part of n-butyllithium was added, and the resultant mixture was polymerized at a constant temperature of 50°C for 1 hour. When the conversion rate had reached 100%,

the mixture was supplemented with 0.75 part of tetrahydrofuran and 65 parts of butadiene, and this mixture was polymerized while raising the temperature from 50°C to 80°C. When the conversion rate had reached 100%, the mixture was supplemented with 15 parts of styrene. Polymerization was further continued to obtain an unhydrogenated A-B1-B2 triblock copolymer. Sampling was carried out in the same manner as in Production example 6. The analysis results showed that the obtained polymer consisted of a 15% styrene block (block A), a butadiene block having 1,2-vinyl content of 35% (block B1), and a butadiene block having 1,2-vinyl content of 10% (block B2), and had a number average molecular weight of 200,000.

In a separate vessel, 1 part of titanocenedichloride was dispersed in cyclohexane, and allowed to react with 0.5 part of triethylaluminum at room temperature. The obtained uniform solution was added to the above polymer solution, and hydrogenation reaction was effected for 2 hours at 50°C under a hydrogen pressure of 50 kgf/cm², to obtain a hydrogenated polymer D2 having a hydrogenation rate of almost 100%.

(8-3) Production example 8: Styrene-butadiene-styrene block copolymer

A jacketed autoclave equipped with a stirrer was dried and purged with nitrogen. Under nitrogen gas stream, cyclohexane and 0.08 part of tetrahydrofuran were

added thereto. The temperature was then raised, and when the internal temperature had reached 70°C, a cyclohexane solution containing 0.052 part of n-butyllithium was added. The resultant mixture was then supplemented with
5 15.5 parts of styrene, and then the mixture was polymerized for 60 minutes (first stage). Next, a mixture consisting of 3 parts of styrene and 20 parts of butadiene was added, and the resulting mixture was polymerized for 60 minutes (second stage). A mixture
10 consisting of 3 parts of styrene and 20 parts of butadiene was again added, and the resulting mixture was polymerized for 60 minutes (third stage). A mixture consisting of 3 parts of styrene and 20 parts of butadiene was again added, and the resulting mixture was
15 polymerized for 60 minutes (fourth stage), to allow three tapered blocks to polymerize. Next, 15.5 parts of styrene were added, and the resulting mixture was polymerized for 60 minutes (fifth stage). The polymerization conversion rate was 100%.

20 During polymerization, the internal temperature was controlled at 70°C. After polymerization was completed, the polymer solution was supplemented with 2,6-di-tert-butylcatechol, and solvent was then removed by heating, to obtain a block copolymer D3 having 3 tapered blocks
25 which had polystyrene gradually increasing in the polybutadiene block. This copolymer had a number average molecular weight of 128,000, and a styrene content of 40%.

(8-4) Production example 9: Styrene-butadiene radial teleblock copolymer

A jacketed autoclave equipped with a stirrer was dried and purged with nitrogen. Under nitrogen gas stream, cyclohexane and 2.75 parts of tetrahydrofuran were added thereto. The mixture was supplemented with 25 parts of styrene, and the temperature was raised to 60°C. The mixture was then supplemented with a cyclohexane solution containing 0.175 parts of n-butyllithium, and the resultant mixture was then polymerized for 60 minutes (first stage). Next, a mixture consisting of 3 parts of styrene and 20 parts of butadiene was added, and the resulting mixture was polymerized for 60 minutes (second stage). Next, a mixture consisting of 3 parts of styrene and 20 parts of butadiene was added, and the resulting mixture was polymerized for 60 minutes (third stage). Next, 29 parts of butadiene were added, and polymerization was carried out until 100% conversion rate was reached. The resulting mixture was supplemented with 0.1 parts of silicon tetrachloride as a coupling agent, and a coupling reaction was completed. After polymerization had finished, the polymer solution was supplemented with 2,6-di-tert-butylcatechol, and solvent was then removed by heating, to obtain a coupling-type styrene-butadiene block copolymer D4 having tapered blocks. This copolymer had a styrene content of 31% and a number average molecular weight of 200,000.

(8-5) Styrene-butadiene-styrene block copolymer

D5: A product "TR2500" (trade name) manufactured by JSR Corporation was used.

(8-6) Hydrogenated product of styrene-butadiene block
5 copolymer

D6: A product "DYNARON 4600P" (trade name) manufactured by JSR Corporation was used.

(9) Component (E)

Production example 10: Graft polymer

10 A stainless steel autoclave having an internal
volume of 10 liters and equipped with a ribbon blade was
purged with nitrogen. Then, 30 parts (solid matter) of
the above polymer D2 which had been uniformly dissolved
in toluene as a solvent, 52.5 parts of styrene, 17.5
15 parts of acrylonitrile, 120 parts of toluene, and 0.1
part of tert-dodecylmercaptan were added to the autoclave
under nitrogen gas stream, and the temperature of the
mixture was elevated under stirring. When the internal
temperature had reached 50°C, the mixture was
20 supplemented with 0.5 part of benzoylperoxide and 0.1
part of dicumylperoxide. The temperature was further
raised, and after reaching 80°C, a polymerization
reaction was carried out while maintaining the
temperature at 80°C. Six hours after the start of
25 polymerization, the temperature was raised over 1 hour to
120°C, and the reaction was further continued for 2 hours
and then finished. The conversion rate was 97%.

After cooling down to 100°C, the mixture was supplemented with 0.2 part of 2,2-methylenebis-4-methyl-6-tert-butylphenol. The reaction mixture was then taken out of the autoclave, and unreacted matter and solvent
5 were distilled off by steam distillation. The polymer was then pelletized to obtain a graft polymer E. This polymer had a graft ratio of 45%, and the acetone soluble matter thereof had a limiting viscosity $[\eta]$ of 0.45 dl/g.

(10) Component (F)

10 A TM polymer TM-S4L77 (trade name of an SEPS-aromatic polycarbonate block copolymer) manufactured by Kuraray Co., Ltd., was used.

(11) Component (G)

The following maleic-anhydride-modified polyolefins
15 manufactured by Sanyo Chemical Industries, Ltd., were used as Component (G) of the present invention.

G1: YUMEX 1001 (trade name: a product of maleic anhydride content of 5%).

G2: YUMEX 1010 (trade name: a product of maleic anhydride
20 content of 10%).

(12) Other Components (H)

(12-1) H1: Aromatic polycarbonate

A product "NOVALEX 7022PJ" (trade name) (viscosity average molecular weight of 22,000) manufactured by
25 Mitsubishi Engineering-Plastics Corporation was used.

(12-2) H2: Polybutylene terephthalate

A product "DURANEX XD477" (trade name) (intrinsic viscosity of 1.2 dl/g) manufactured by Polyplastics Co., Ltd., was used.

Examples I-1 to I-23 and Comparative Examples I-1 to I-3

5 The components were mixed in accordance with the formulations shown in Table 1-1 by a Henschel mixer. Then, the mixture was melt-kneaded using a double-screw extruder (cylinder temperature set to 240°C) to obtain pellets. The resultant pellets were sufficiently dried
10 and then injection molded (cylinder temperature set to 230°C) to obtain test pieces for evaluation. The test pieces were used to evaluate impact resistance, chemical resistance, surface appearance of molded article, and antistatic property, according to the evaluation methods
15 as described above. The evaluation results are shown in Table 1-2.

Table 1-2

		Evaluation results				
		Impact resistance-1 (KJ/m ²)	Chemical resistance-A1	Chemical resistance-A2	Surface appearance-1	Antistatic property-1 (Ω)
Example	I-1	7	○	○	◎	2×10^{10}
	I-2	13	○	○	◎	2×10^{10}
	I-3	10	○	○	◎	2×10^{10}
	I-4	12	○	○	◎	2×10^{10}
	I-5	13	○	○	◎	2×10^9
	I-6	15	○	○	◎	9×10^8
	I-7	19	○	○	◎	2×10^{10}
	I-8	18	○	○	◎	2×10^{10}
	I-9	25	○	○	◎	2×10^{10}
	I-10	23	○	○	◎	2×10^{10}
	I-11	28	○	○	◎	2×10^{10}
	I-12	18	○	○	◎	3×10^9
	I-13	10	○	○	○	5×10^{10}
	I-14	14	○	○	○	7×10^8
	I-15	22	○	○	○	5×10^{10}
	I-16	19	○	○	○	5×10^{10}
	I-17	24	○	○	○	5×10^{10}
	I-18	27	○	○	○	5×10^{10}
	I-19	19	○	○	○	5×10^{10}
	I-20	22	○	○	◎	2×10^{10}
	I-21	31	○	○	○	5×10^{10}
	I-22	20	○	○	◎	3×10^8
	I-23	20	○	○	◎	3×10^8
Comparative example	I-1	4	○	○	×	3×10^{11}
	I-2	2	○	○	×	1×10^{16} or more
	I-3	4	○	○	×	4×10^8

The following is clear from the results shown in Table 1-2.

- 5 The molded articles of Examples I-1 to I-23 of the present invention had excellent impact resistance, chemical resistance, surface appearance of molded

articles, and antistatic property. Meanwhile, Examples I-22 and I-23 showed both chemical resistances A1 and A2 to be given the O mark, but they were slightly poorer in chemical resistance than that of Examples I-1 to I-21.

5 On the other hand, Comparative Example I-1, which used a smaller amount of Component (A) than the inventive range, and a larger amount of Component (B) than the inventive range, had poor impact resistance and surface appearance of molded articles. Comparative Example I-2,
10 which used a smaller amount of Component (C1) than the inventive range, had poor impact resistance, surface appearance of molded articles and antistatic property. Comparative Example I-3, which used a larger amount of Component (C1) than the inventive range, had poor impact
15 resistance and surface appearance of molded articles.

Example I-24

Production of a three-layer sheet

Three-layer sheet (1)

20 A three-layer sheet was produced using each of the compositions of Example I-19 as both surface layers (each having a thickness of 100 μm) and the Component (B1) as the middle layer (thickness of 800 μm). The resultant sheet was vacuum formed to produce a tray.

Three-layer sheet (2)

Using the composition of Example I-22 and Component (B1), a three-layer sheet and a tray by vacuum forming were produced in the same manner as described above.

5 Three-layer sheet (3)

Using the composition of Example I-22 and ABS (composition consisting of Component (A1)/Component (A2) = 40/60%), a three-layer sheet was produced with the composition of Example I-22 as both surface layers (each
10 having a thickness of 100 μm) and the ABS as the middle layer (thickness of 800 μm). A tray was produced by vacuum forming in the same manner as described above.

Examples II-1 to II-15 and Comparative Examples II-1 to II-3

15 All the components were mixed in accordance with the formulations shown in Tables 2-1 and 2-2 by a Henschel mixer. The mixture was then melt-kneaded using a double-screw extruder (cylinder temperature set to 200°C) to obtain pellets. The resultant pellets were sufficiently
20 dried and then injection molded (cylinder temperature set to 200°C) to obtain test pieces for evaluation.

The test pieces were used to evaluate impact resistance, chemical resistance and antistatic property, according to the evaluation methods as described above.

25 The evaluation results are shown in Table 2-1.

Table 2-1

	Formulation															Evaluation Results				
	Component (A)		Component (B)		Component (C1)		Component (G)		Component (D)		Component (E)		Component (F)		Component (C2-4)		Impact resistance-2 (kgf-cm)	Chemical resistance-A1	Chemical resistance-A2	Antistatic property-2 (Ω)
															Kind	Parts				
	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts				
Example	II-1	A1	7.5	B1	80	C1-1	13	G1	15	-	-	-	-	-	-	-	120	○	○	5×10 ⁹
		A2	12.5																	
	II-2	A1	7.5	B1	80	C1-1	13	G2	15	-	-	-	-	-	-	-	120	○	○	4×10 ⁹
		A2	12.5																	
	II-3	A1	7.5	B1	80	C1-1	15	G1	25	-	-	-	-	-	-	-	110	○	○	5×10 ⁹
		A2	12.5																	
	II-4	A1	7.5	B1	80	C1-1	30	G1	15	-	-	-	-	-	-	-	150	○	○	6×10 ⁸
		A2	12.5																	
	II-5	A1	35.8	B1	5	C1-1	15	G1	5	-	-	-	-	-	-	-	180	○	○	3×10 ⁹
		A2	59.2																	
	II-6	A1	7.5	B1	80	C1-1	13	G1	15	-	-	-	-	-	C2-4-3	0.4	120	○	○	3×10 ⁸
		A2	12.5																	
	II-7	A1	35.8	B1	5	C1-1	15	G1	5	-	-	-	-	-	C2-4-3	0.4	180	○	○	2×10 ⁸
		A2	59.2																	
	II-8	A1	7.5	B1	80	C1-1	13	G1	15	D1	30	-	-	-	-	-	420	○	○	2×10 ⁹
	A2	12.5																		
II-9	A1	7.5	B1	80	C1-1	13	G1	15	D2	30	-	-	-	-	-	350	○	○	2×10 ⁹	
	A2	12.5																		
II-10	A1	7.5	B1	80	C1-1	13	G1	15	D3	30	-	-	-	-	-	450	○	○	2×10 ⁹	
	A2	12.5																		
II-11	A1	7.5	B1	80	C1-1	13	G1	15	D4	30	-	-	-	-	-	500	○	○	1×10 ⁹	
	A2	12.5																		
II-12	A1	7.5	B1	80	C1-1	13	G1	15	D4	30	-	-	-	-	C2-4-3	0.4	500	○	○	2×10 ⁸
	A2	12.5																		
II-13	A1	35.8	B1	5	C1-1	15	G1	5	-	-	60	-	-	-	-	520	○	○	3×10 ⁹	
	A2	59.2																		
II-14	A1	35.8	B1	5	C1-1	15	G1	5	-	-	40	10	-	-	-	520	○	○	3×10 ⁹	
	A2	59.2																		
II-15	A1	7.5	B1	80	C1-1	15	G1	5	D4	20	-	-	-	-	-	500	○	○	1×10 ⁹	
	A2	12.5																		

Table 2-2

		Formulation												Evaluation Results						
		Component (A)		Component (B)		Component (C1)		Component (G)		Component (D)		Component (F)		Component (C2-4)		Impact resistance-2 (kgf/cm)	Chemical resistance-A1	Chemical resistance-A2	Antistatic property-2 (Ω)	
		Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts					
Comparative Example	II-1	A1	2	B1	98	C1-1	13	G1	15	-	-	-	-	-	-	-	30	O	O	5×10^{11}
	II-2	A1	7.5	B1	80	C1-1	0.05	G1	15	-	-	-	-	-	-	10	O	O	1×10^{16} or more	
		A2	12.5																	
II-3	A1	7.5	B1	80	C1-1	150	G1	15	-	-	-	-	-	-	-	40	O	O	5×10^9	
	A2	12.5																		

The following is clear from the results shown in Tables 2-1 and 2-2.

The molded articles of Examples II-1 to II-15 of the present invention had excellent impact resistance,
5 chemical resistance and antistatic property.

On the other hand, Comparative Example II-1, which used a smaller amount of Component (A) than the inventive range, and a larger amount of Component (B) than the inventive range, had poor impact resistance and
10 antistatic property. Comparative Example II-2, which used a smaller amount of Component (C1) than the inventive range, had poor impact resistance and antistatic property. Comparative Example II-3, which used a larger amount of Component (C1) than the inventive
15 range, had poor impact resistance.

Examples III-1 to III-18 and Comparative Examples III-1 and III-2

All the components were mixed in accordance with the formulations shown in Tables 3-1 and 3-2 by a Henschel
20 mixer. The mixture was then melt-kneaded using a double-screw extruder (cylinder temperature set to 220°C) to obtain pellets. The resultant pellets were sufficiently dried and then injection molded (cylinder temperature set to 220°C) to obtain test pieces for evaluation.

25 The test pieces were used to evaluate impact resistance, chemical resistance, surface appearance of molded articles, and antistatic property, according to

the evaluation methods as described above. The evaluation results are shown in Tables 3-1 and 3-2.

Table 3-2

		Formulation												Evaluation Results								
		Component (A)		Component (B)		Component (C1)		Component (C2-1)		Component (D)		Component (E)		Component (F)		Component (C2-4)		Impact resistance-2 (kgf/cm)	Chemical resistance-A1	Chemical resistance-A2	Antistatic property-3 (Ω)	Surface appearance-2 (gloss) (%)
Comparative example		III-1	A1	2	B1	98	C1-1	4	C2-1-1	7	-	-	-	-	-	-	30	○	○	5×10 ¹¹	85	
		III-2	A1 A2	9 11	B1	80	C1-1	0.1	C2-1-1	10.9	-	-	-	-	-	-	20	○	○	3×10 ¹³	85	

The following is clear from the results shown in Tables 3-1 and 3-2.

The molded articles of Examples III-1 to III-18 of the present invention had excellent chemical resistance and
5 antistatic property, and the molded articles of Examples III-1 to III-17 also had excellent impact resistance, and surface gloss of molded articles.

Comparative Example III-1, which used a smaller amount of Component (A) than the inventive range, and a larger
10 amount of Component (B) than the inventive range, had poor impact resistance and antistatic property. Comparative Example III-2, which used a smaller amount of Component (C1) than the inventive range, had poor impact resistance and antistatic property.

15 Example IV-1

Specified amounts of the components shown in Table 4 were mixed by a Henschel mixer. The mixture was then melt-kneaded using a double-screw extruder (cylinder temperature set to 220°C) to obtain a pelletized thermoplastic resin
20 composition. As described above, the polyethylene content of Component (C2-3) was listed as B4 in Table 4, since it contained polyethylene corresponding to the Component (B).

Next, the Component (B3) for forming the substrate layer and the thermoplastic resin composition for forming an
25 antistatic layer on the front and back faces of the substrate layer were coextruded at a temperature of 210°C, whereby a 1 mm-thick multilayer sheet was obtained whose substrate layer

was 800 μm thick and antistatic layers were each 100 μm thick. This multilayer sheet was evaluated for surface resistivity (antistatic property), chemical resistance and surface appearance.

- 5 Further, the multilayer sheet was vacuum formed to produce a tray. This tray was evaluated for surface appearance. The results are shown in Table 4.

Examples IV-2 to IV-14

- 10 Thermoplastic resin compositions, sheets and trays were produced in the same manner as in Example IV-1, except that the specified amounts of the components shown in Table 4 were used. Surface resistivity and surface appearance were evaluated. The results are shown in Table 4.

Table 4

		Example													
Raw material component (parts)	Component (A)	IV-1	IV-2	IV-3	IV-4	IV-5	IV-6	IV-7	IV-8	IV-9	IV-10	IV-11	IV-12	IV-13	IV-14
		6	6	6	6	6	8	6	6	5	17		10.6	6	6
Component (B)	A2	11	11	11	11	11	14	11	12	10		17	19.4	11	11
	B1	40	49			40	35	29	45	36	44	44	40	56.97	55.81
	B3			40	40										
	B4*	15.81	7.44	15.81	15.81	15.81	15.81	26.04	15.81	15.81	15.81	15.81	15.81	0.028	
Component (C1)	C1-1	26	26	26		26	26	26	20	32	22	22	13	26	27.19
	C1-2				26										
Component (C2-3)		1.19	0.56	1.19	1.19	1.19	1.19	1.96	1.19	1.19	1.19	1.19	1.19	0.002	
Component (D)	D5	20	20	20	20		20	20	20	20			20	20	20
	D6					20									
(C1) (A) + (B) + (C1) + (D)		0.219	0.219	0.219	0.219	0.219	0.219	0.220	0.168	0.269	0.223	0.223	0.123	0.217	0.227
Charge controlling property-1 (Ω)		3×10 ⁷	3×10 ⁷	1×10 ⁷	8×10 ⁷	3×10 ⁷	3×10 ⁷	2×10 ⁷	5×10 ⁷	=10 ⁷	5×10 ⁷	5×10 ⁷	1×10 ⁹	5×10 ⁸	5×10 ⁸
Impact resistance-1 (kJ/m ²)		15	17	13	12	15	18	13	12	14	5	2	16	-	-
Chemical resistance B	EtOH	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	MEK	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Surface appearance-3		○	○	○	○	○	○	○	○	○	○	○	○	○	○

*: Since the antistatic agent composition containing Component (C2-3) contains polyethylene (corresponding to Component (B)) as a matrix, the polyethylene content is listed in the B4 column.

The following is clear from the results shown in Table 4.

Examples IV-1 to IV-14 of the present invention had low surface resistivity, and excellent charge controlling property, chemical resistance and surface appearance.

The effects on antistatic property resulting from the combination of Component (C1) and Component (C2-3) are clear from comparison between Example IV-1 and Example IV-14. That is, the amounts of Component (C1) and Component (C2-3) in Example IV-1 are respectively 26% and 1.19%, making a total of 27.19%. In contrast, the amounts of Component (C1) and Component (C2-3) in Example IV-14 are respectively 27.19% and 0%, making a total of 27.19%. Therefore, in Example IV-1 and Example IV-14, even though the total content of the Component (C1) and Component (C2-3) which provide antistatic property is the same, it can be seen that Example IV-1, which used Component (C1) and Component (C2-3) together, had a surface resistivity more than 10 times lower and more excellent antistatic property.

Examples V-1 to V-23 and Comparative Examples V-1 to V-5

The components were mixed in accordance with the formulations shown in Tables 5-1 and 5-2 by a Henschel mixer. The mixture was then melt-kneaded using a double-screw extruder (cylinder temperature set to 220°C) to obtain pellets. The resultant pellets were sufficiently dried and then injection molded (cylinder temperature set

to 210°C) to obtain test pieces for evaluation of surface appearance of molded articles.

A three-layer sheet was produced by coextrusion (temperature of 220°C) with an 800 µm-thick sheet of the polymer (B3) for the core layer above and below which was laminated the resin composition in a 100 µm thickness, whereby a 1 mm-thick sheet was obtained. This sheet was cut to form test pieces for evaluation of charge controlling property and chemical resistance.

Using the above evaluation methods, charge controlling property, chemical resistance and surface appearance of molded articles were evaluated.

Trays were further molded by vacuum forming the sheets obtained in Examples V-1, V-4, V-5, V-7 to V-9, V-11, V-21, and V-22 at a preheating temperature of 200°C. The surface resistivity near the corner of the tray was also measured by the same method as the charge controlling property evaluation method.

The evaluation results are shown in Tables 5-1 and 5-2.

Table 5-1

	Formulation										Evaluation results				
	Component (A)		Component (B)		Component (C1)		Component (C2-2)		Component (D)		Tray surface resistivity (Ω)	Chemical resistance C		Surface appearance-1	
	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts		Chemical resistance -C1	Chemical resistance -C2		
Example	V-1	-	B3	80	C1-2	20	C2-2-1	1	-	-	2×10 ⁹	○	○	○	
	V-2	-	B1	80	C1-1	20	C2-2-1	1	-	-	-	○	○	○	
	V-3	-	B3	84	C1-2	16	C2-2-1	1	-	-	-	○	○	○	
	V-4	-	B3	95	C1-2	5	C2-2-1	1	-	-	3×10 ¹¹	○	○	○	
	V-5	-	B3	65	C1-2	20	C2-2-1	1	D2	15	7×10 ⁸	○	○	○	
	V-6	-	B3	69	C1-2	16	C2-2-1	1	D2	15	-	○	○	○	
	V-7	-	B3	80	C1-2	5	C2-2-1	1	D2	15	5×10 ¹⁰	○	○	○	
	V-8	-	B3	80	C1-2	5	C2-2-1	1	D4	15	5×10 ¹⁰	○	○	○	
	V-9	A1 A2	B3	32	C1-2	20	C2-2-1	1	D3	28	3×10 ⁷	○	○	◎	
	V-10	A1 A2	B1	32	C1-2	20	C2-2-1	1	D3	28	-	○	○	◎	
	V-11	A1 A2	B3	32	C1-2	20	C2-2-1	0.5	D3	28	4×10 ⁷	○	○	◎	
	V-12	A1 A2	B3	32	C1-2	20	C2-2-1	0.2	D3	28	-	○	○	◎	
	V-13	A1 A2	B3	32	C1-2	20	C2-2-2	1	D3	28	-	○	○	◎	
	V-14	A1 A2	B3	32	C1-2	20	C2-2-3	1	D3	38	-	○	○	◎	
	V-15	A1 A2	B3	32	C1-2	20	C2-2-1	1	D1	28	-	○	○	◎	
	V-16	A1 A2	B3	32	C1-2	20	C2-2-1	1	D2	28	-	○	○	◎	
	V-17	A1 A2	B3	32	C1-2	20	C2-2-1	1	D4	28	-	○	○	◎	
	V-18	A1 A2	B3	39	C1-2	20	C2-2-1	1	D4	18	-	○	○	◎	
	V-19	A1 A2	B3	36	C1-2	16	C2-2-1	1	D4	28	-	○	○	◎	
	V-20	A1 A2	B3	28	C1-2	20	C2-2-1	1	D4	20	-	○	○	◎	
	V-21	A1 A2	B1	65	C1-1	5	C2-2-1	1	D2	15	8×10 ⁹	○	○	◎	
	V-22	A1 A2	B1	65	C1-1	5	C2-2-1	1	D4	15	7×10 ⁹	○	○	◎	
	V-23	A1 A2	B3	32	C1-2	20	C2-2-1	0.0005	D3	28	-	○	○	◎	

Table 5-2

		Formulation										Evaluation results				
		Component (A)		Component (B)		Component (C1)		Component (C2-2)		Component (D)		Charge controlling property-1 (Ω)	Chemical resistance C			Surface appearance-1
		Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts		Chemical resistance -C1	Chemical resistance -C2		
Comparative Example	V-1	-	-	B3	98	C1-2	2	C2-2-1	1	-	-	$\times 10^{13}$ or more	○	○	×	
	V-2	-	-	B3	60	C1-2	40	C2-2-1	1	-	-	2×10^9	×	×	×	
	V-3	-	-	B3	80	C1-2	20	C2-2-1	0.0005	-	-	7×10^9	○	○	○	
	V-4	-	-	B3	80	C1-2	20	C2-2-1	15	-	-	8×10^3	×	×	×	
	V-5	-	-	B3	30	C1-2	20	C2-2-1	1	D2	50	9×10^3	○	×	×	

Examples V-1 to V-4 and Comparative Examples V-1 to V-3 relate to the second thermoplastic resin composition which comprises Components (B), (C1) and (C2-2) of the present invention as essential components. Examples V-5
5 to V-8 and Comparative Examples V-4 and V-5 relate to the third thermoplastic resin composition which comprises components (B), (C1), (C2-2) and (D) of the present invention as essential components. Examples V-9 to V-23 relate to the first thermoplastic resin composition which
10 comprises Components (A), (B), (C1), (C2-2) and (D) of the present invention as essential components.

The following is clear from the results shown in Tables 5-1 and 5-2.

The molded articles of Examples V-1 to V-23 of the
15 present invention had excellent charge controlling property, chemical resistance and surface appearance of molded articles.

Comparative Example V-1, which used a larger amount of Component (B) than the inventive range, and a smaller
20 amount of Component (C1) than the inventive range, had poor charge controlling property and surface appearance of molded articles. Comparative Example V-2, which used a smaller amount of Component (B) than the inventive range, and a larger amount of Component (C1) than the
25 inventive range, had poor chemical resistance and surface appearance of molded articles. Comparative Example V-3, which used a smaller amount of Component (C2-2) than the

inventive range, had poor charge controlling property. Comparative Example V-4, which used a larger amount of Component (C2-2) than the inventive range, had poor chemical resistance and surface appearance of molded articles. Comparative Example V-5, which used a larger amount of Component (D) than the inventive range, had poor chemical resistance and surface appearance of molded articles.

Examples VI-1 to VI-15 and Comparative Example VI-1

10 The components were mixed in accordance with the formulations shown in Table 6 by a Henschel mixer. The mixture was then melt-kneaded using a double-screw extruder (cylinder temperature set to 220°C) to obtain pellets. The resultant pellets were sufficiently dried and then injection molded (cylinder temperature set to 210°C) to obtain test pieces for impact resistance evaluation.

 A three-layer sheet was produced by coextrusion (temperature of 220°C) with an 800 µm-thick sheet of the polymer (A1) for the core layer above and below which was laminated the thermoplastic resin composition in a 100 µm thickness, whereby a 1 mm-thick sheet was obtained. This sheet was cut to form test pieces for evaluation of charge controlling property, sustainability of charge controlling property, and chemical resistance. The results for each of the evaluations are shown in Table 6.

Table 6

		Formulation														Evaluation results					
		Component (A)				Component (B)				Component (C1)				Component (D)		Component (C2-4)		Charge controlling property-2 (Ω)	Sustain-ability of charge controlling property	Chemical resistance-CI	Impact resistance-3 (kgf-cm)
		Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts				
Example	VI-1	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-1	1(10)	-	-	3×10 ⁶	○	○	210		
	VI-2	A1	7	A2	I1	B3	36	C1-2	16	D4	30	C2-4-1	1(10)	-	-	5×10 ⁶	○	○	180		
	VI-3	A1	7	A2	I1	B1	36	C1-1	16	D4	30	C2-4-1	1(10)	-	-	5×10 ⁶	○	○	210		
	VI-4	A1	7	A2	I1	B1	36	C1-2	16	D3	30	C2-4-1	1(10)	-	-	3×10 ⁶	○	○	180		
	VI-5	A1	7	A2	I1	B1	36	C1-2	16	D2	30	C2-4-1	1(10)	-	-	3×10 ⁶	○	○	170		
	VI-6	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-2	1(2)	-	-	6×10 ⁶	○	○	230		
	VI-7	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-1	0.5(5)	-	-	7×10 ⁶	○	○	210		
	VI-8	A1	7	A2	I1	B1	42	C1-2	10	D4	30	C2-4-1	1(10)	-	-	6×10 ⁷	○	○	230		
	VI-9	A1	7	A2	I1	B1	32	C1-2	20	D4	30	C2-4-1	0.2(2)	-	-	4×10 ⁶	○	○	170		
	VI-10	A1	7	A2	I1	B1	42	C1-2	10	D4	30	C2-4-1	1(10)	C2-2-1	1.0	8×10 ⁶	○	○	230		
	VI-11	A1	7	A2	I0	B1	52	C1-2	16	D3	15	C2-4-1	1(10)	-	-	3×10 ⁶	○	○	220		
	VI-12	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-2	1(2)	C2-2-1	1.0	2×10 ⁶	○	○	230		
	VI-13	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-2	1(2)	C2-2-1	0.5	2×10 ⁶	○	○	230		
	VI-14	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-2	1(2)	C2-2-1	2.0	2×10 ⁶	○	○	230		
	VI-15	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-1	0.001 (0.01)	-	-	5×10 ⁵	○	○	210		
Comparative example	VI-1	A1	7	A2	I1	B1	12	C1-2	40	D4	30	C2-4-1	1(10)	-	-	3×10 ⁶	○	×	30		

: The values outside the brackets of component (C2-4) denote the loading parts as a lithium salt, while the values inside the brackets denote the loading parts as the master batch.

The following is clear from the results shown in Table 6.

The molded articles of Examples VI-1 to VI-15 had excellent charge controlling property, sustainability of charge controlling property, chemical resistance and impact resistance. The molded articles of Examples VI-1 to VI-14 had especially excellent charge controlling property.

On the other hand, Comparative Example V-1, which used a larger amount of Component (C1) than the inventive range, had poor chemical resistance and impact resistance.

INDUSTRIAL APPLICABILITY

The thermoplastic resin composition according to the present invention is more excellent than prior art in impact resistance, chemical resistance, surface appearance of molded articles and antistatic property or charge controlling property, and can be used as various parts in fields requiring high performance, such as the fields of vehicles, electrics or electronics, office automation or home appliances, and sanitary care.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic cross-sectional view illustrating a molded article having a two-layer structure as a multilayer molded article of the present invention; and

Figure 2 is a schematic cross-sectional view illustrating a molded article having a three-layer structure as a multilayer molded article of the present invention.

5 DESCRIPTION OF SYMBOLS

1: Two-layer molded article

11: Substrate layer

12, 12a and 12b: Antistatic layer

2: Three-layer molded article

CLAIMS

1. A thermoplastic resin composition comprising 5 to 95%
by mass of the following Component (A) and 95 to 5% by mass
5 of the following Component (B) (with the total of Component
(A) and Component (B) being 100% by mass), and

further comprising 0.5 to 100 parts by mass of the following
Component (C1) per 100 parts by mass of the total of Component
(A) and Component (B), and further comprising at least one
10 component selected from the group consisting of the following
Component (D), Component (E), Component (F) and Component (G)
in an amount of 1 to 200 parts by mass per 100 parts by mass
of the total of Component (A) and Component (B), wherein:

Component (A): a styrene resin resulting from
15 (co)polymerization of an aromatic vinyl compound, or an
aromatic vinyl compound and another vinyl monomer
copolymerizable with the aromatic vinyl compound in a presence
or absence of a rubber-like polymer, excluding the following
Component (D);

20 Component (B): an olefin resin,

Component (C1): a block copolymer comprising an olefin
polymer block (c1-1) and a hydrophilic polymer block (c1-2);

Component (D): at least one polymer selected from the group

consisting of a block copolymer (D-a) comprising a polymer block (d-1) mainly consisting of an aromatic vinyl compound and a polymer block (d-2) mainly consisting of a conjugated diene compound, and a hydrogenated product (D-b) thereof;

5 Component (E): a graft polymer resulting from (co)polymerization of an aromatic vinyl compound, or an aromatic vinyl compound and another vinyl monomer copolymerizable with the aromatic vinyl compound in a presence of the Component (D);

10 Component (F): an aromatic polycarbonate block copolymer comprising a polymer block (f-1) consisting of the Component (D), and an aromatic carbonate polymer block (f-2); and

 Component (G): a low molecular weight polyolefin modified with an unsaturated acid and/or unsaturated acid
15 anhydride.

2. The thermoplastic resin composition according to claim 1, further comprising at least one component selected from the group consisting of the following Component (C2-1),
20 Component (C2-2), Component (C2-3) and Component (C2-4) in an amount of 0.001 to 60 parts by mass per 100 parts by mass of the total of Component (A) and Component (B), wherein:

 Component (C2-1): a polyetherpolyamide and/or

polyetherpolyester;

Component (C2-2): a nonionic antistatic agent;

Component (C2-3): a boron compound; and

Component (C2-4): a lithium salt.

5

3. A molded article formed of the thermoplastic resin composition according to claim 1 or 2.

4. The molded article according to claim 3 which is a sheet
10 or a film.

5. A multilayer molded article comprising a substrate to which a sheet or film formed of the thermoplastic resin composition according to claim 1 or 2 is laminated onto at least
15 one surface of the substrate.

6. The multilayer molded article according to claim 5, wherein the substrate is a sheet or film formed of an olefin resin.

(8-4) Production example 9: Styrene-butadiene radial teleblock copolymer

A jacketed autoclave equipped with a stirrer was dried and purged with nitrogen. Under nitrogen gas stream, cyclohexane and 2.75 parts of tetrahydrofuran were added thereto. The mixture was supplemented with 25 parts of styrene, and the temperature was raised to 60°C. The mixture was then supplemented with a cyclohexane solution containing 0.175 parts of n-butyllithium, and the resultant mixture was then polymerized for 60 minutes (first stage). Next, a mixture consisting of 3 parts of styrene and 20 parts of butadiene was added, and the resulting mixture was polymerized for 60 minutes (second stage). Next, a mixture consisting of 3 parts of styrene and 20 parts of butadiene was added, and the resulting mixture was polymerized for 60 minutes (third stage). Next, 29 parts of butadiene were added, and polymerization was carried out until 100% conversion rate was reached. The resulting mixture was supplemented with 0.1 parts of silicon tetrachloride as a coupling agent, and a coupling reaction was completed. After polymerization had finished, the polymer solution was supplemented with 2,6-di-tert-butylcatechol, and solvent was then removed by heating, to obtain a coupling-type styrene-butadiene block copolymer D4 having tapered blocks. This copolymer had a styrene content of 31% and a number average molecular weight of 200,000.

(8-5) Styrene-butadiene-styrene block copolymer

D5: A product "TR2500" (trade name) manufactured by JSR Corporation was used.

(8-6) Hydrogenated product of styrene-butadiene block
5 copolymer

D6: A product "DYNARON 4600P" (trade name) manufactured by JSR Corporation was used.

(9) Component (E)

Production example 10: Graft polymer

10 A stainless steel autoclave having an internal
volume of 10 liters and equipped with a ribbon blade was
purged with nitrogen. Then, 30 parts (solid matter) of
the above polymer D2 which had been uniformly dissolved
in toluene as a solvent, 52.5 parts of styrene, 17.5
15 parts of acrylonitrile, 120 parts of toluene, and 0.1
part of tert-dodecylmercaptan were added to the autoclave
under nitrogen gas stream, and the temperature of the
mixture was elevated under stirring. When the internal
temperature had reached 50°C, the mixture was
20 supplemented with 0.5 part of benzoylperoxide and 0.1
part of dicumylperoxide. The temperature was further
raised, and after reaching 80°C, a polymerization
reaction was carried out while maintaining the
temperature at 80°C. Six hours after the start of
25 polymerization, the temperature was raised over 1 hour to
120°C, and the reaction was further continued for 2 hours
and then finished. The conversion rate was 97%.

After cooling down to 100°C, the mixture was supplemented with 0.2 part of 2,2-methylenebis-4-methyl-6-tert-butylphenol. The reaction mixture was then taken out of the autoclave, and unreacted matter and solvent
5 were distilled off by steam distillation. The polymer was then pelletized to obtain a graft polymer E. This polymer had a graft ratio of 45%, and the acetone soluble matter thereof had a limiting viscosity $[\eta]$ of 0.45 dl/g.

(10) Component (F)

10 A TM polymer TM-S4L77 (trade name of an SEPS-aromatic polycarbonate block copolymer) manufactured by Kuraray Co., Ltd., was used.

(11) Component (G)

The following maleic-anhydride-modified polyolefins
15 manufactured by Sanyo Chemical Industries, Ltd., were used as Component (G) of the present invention.

G1: YUMEX 1001 (trade name: a product of maleic anhydride content of 5%).

G2: YUMEX 1010 (trade name: a product of maleic anhydride
20 content of 10%).

(12) Other Components (H)

(12-1) H1: Aromatic polycarbonate

A product "NOVALEX 7022PJ" (trade name) (viscosity average molecular weight of 22,000) manufactured by
25 Mitsubishi Engineering-Plastics Corporation was used.

(12-2) H2: Polybutylene terephthalate

A product "DURANEX XD477" (trade name) (intrinsic viscosity of 1.2 dl/g) manufactured by Polyplastics Co., Ltd., was used.

Examples I-1 to I-23 and Comparative Examples I-1 to I-3

5 The components were mixed in accordance with the formulations shown in Table 1-1 by a Henschel mixer. Then, the mixture was melt-kneaded using a double-screw extruder (cylinder temperature set to 240°C) to obtain pellets. The resultant pellets were sufficiently dried
10 and then injection molded (cylinder temperature set to 230°C) to obtain test pieces for evaluation. The test pieces were used to evaluate impact resistance, chemical resistance, surface appearance of molded article, and antistatic property, according to the evaluation methods
15 as described above. The evaluation results are shown in Table 1-2.

Table 1-2

		Evaluation results				
		Impact resistance-1 (KJ/m ²)	Chemical resistance-A1	Chemical resistance-A2	Surface appearance-1	Antistatic property-1 (Ω)
Example	I-1	7	○	○	◎	2×10^{10}
	I-2	13	○	○	◎	2×10^{10}
	I-3	10	○	○	◎	2×10^{10}
	I-4	12	○	○	◎	2×10^{10}
	I-5	13	○	○	◎	2×10^9
	I-6	15	○	○	◎	9×10^8
	I-7	19	○	○	◎	2×10^{10}
	I-8	18	○	○	◎	2×10^{10}
	I-9	25	○	○	◎	2×10^{10}
	I-10	23	○	○	◎	2×10^{10}
	I-11	28	○	○	◎	2×10^{10}
	I-12	18	○	○	◎	3×10^9
	I-13	10	○	○	○	5×10^{10}
	I-14	14	○	○	○	7×10^8
	I-15	22	○	○	○	5×10^{10}
	I-16	19	○	○	○	5×10^{10}
	I-17	24	○	○	○	5×10^{10}
	I-18	27	○	○	○	5×10^{10}
	I-19	19	○	○	○	5×10^{10}
	I-20	22	○	○	◎	2×10^{10}
	I-21	31	○	○	○	5×10^{10}
	I-22	20	○	○	◎	3×10^8
	I-23	20	○	○	◎	3×10^8
Comparative example	I-1	4	○	○	×	3×10^{11}
	I-2	2	○	○	×	1×10^{16} or more
	I-3	4	○	○	×	4×10^8

The following is clear from the results shown in Table 1-2.

- 5 The molded articles of Examples I-1 to I-23 of the present invention had excellent impact resistance, chemical resistance, surface appearance of molded

articles, and antistatic property. Meanwhile, Examples I-22 and I-23 showed both chemical resistances A1 and A2 to be given the O mark, but they were slightly poorer in chemical resistance than that of Examples I-1 to I-21.

5 On the other hand, Comparative Example I-1, which used a smaller amount of Component (A) than the inventive range, and a larger amount of Component (B) than the inventive range, had poor impact resistance and surface appearance of molded articles. Comparative Example I-2,
10 which used a smaller amount of Component (C1) than the inventive range, had poor impact resistance, surface appearance of molded articles and antistatic property. Comparative Example I-3, which used a larger amount of Component (C1) than the inventive range, had poor impact
15 resistance and surface appearance of molded articles.

Example I-24

Production of a three-layer sheet

Three-layer sheet (1)

20 A three-layer sheet was produced using each of the compositions of Example I-19 as both surface layers (each having a thickness of 100 μm) and the Component (B1) as the middle layer (thickness of 800 μm). The resultant sheet was vacuum formed to produce a tray.

Three-layer sheet (2)

Using the composition of Example I-22 and Component (B1), a three-layer sheet and a tray by vacuum forming were produced in the same manner as described above.

5 Three-layer sheet (3)

Using the composition of Example I-22 and ABS (composition consisting of Component (A1)/Component (A2) = 40/60%), a three-layer sheet was produced with the composition of Example I-22 as both surface layers (each
10 having a thickness of 100 μm) and the ABS as the middle layer (thickness of 800 μm). A tray was produced by vacuum forming in the same manner as described above.

Examples II-1 to II-15 and Comparative Examples II-1 to II-3

15 All the components were mixed in accordance with the formulations shown in Tables 2-1 and 2-2 by a Henschel mixer. The mixture was then melt-kneaded using a double-screw extruder (cylinder temperature set to 200°C) to obtain pellets. The resultant pellets were sufficiently
20 dried and then injection molded (cylinder temperature set to 200°C) to obtain test pieces for evaluation.

The test pieces were used to evaluate impact resistance, chemical resistance and antistatic property, according to the evaluation methods as described above.

25 The evaluation results are shown in Table 2-1.

Table 2-1

	Formulation														Evaluation Results					
	Component (A)		Component (B)		Component (C1)		Component (G)		Component (D)		Component (E)		Component (F)		Component (C2-4)		Impact resistance-2 (kgf-cm)	Chemical resistance-A1	Chemical resistance-A2	Antistatic property-2 (Ω)
	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts				
Example	II-1	A1	7.5	B1	80	C1-1	13	G1	15	-	-	-	-	-	-	-	120	○	○	5×10 ⁹
		A2	12.5																	
	II-2	A1	7.5	B1	80	C1-1	13	G2	15	-	-	-	-	-	-	-	120	○	○	4×10 ⁹
		A2	12.5																	
	II-3	A1	7.5	B1	80	C1-1	15	G1	25	-	-	-	-	-	-	-	110	○	○	5×10 ⁹
		A2	12.5																	
	II-4	A1	7.5	B1	80	C1-1	30	G1	15	-	-	-	-	-	-	-	150	○	○	6×10 ⁸
		A2	12.5																	
	II-5	A1	35.8	B1	5	C1-1	15	G1	5	-	-	-	-	-	-	-	180	○	○	3×10 ⁹
		A2	59.2																	
	II-6	A1	7.5	B1	80	C1-1	13	G1	15	-	-	-	-	-	-	-	120	○	○	3×10 ⁸
		A2	12.5																	
	II-7	A1	35.8	B1	5	C1-1	15	G1	5	-	-	-	-	-	-	-	180	○	○	2×10 ⁸
		A2	59.2																	
	II-8	A1	7.5	B1	80	C1-1	13	G1	15	D1	30	-	-	-	-	-	420	○	○	2×10 ⁹
A2		12.5																		
II-9	A1	7.5	B1	80	C1-1	13	G1	15	D2	30	-	-	-	-	-	350	○	○	2×10 ⁹	
	A2	12.5																		
II-10	A1	7.5	B1	80	C1-1	13	G1	15	D3	30	-	-	-	-	-	450	○	○	2×10 ⁹	
	A2	12.5																		
II-11	A1	7.5	B1	80	C1-1	13	G1	15	D4	30	-	-	-	-	-	500	○	○	1×10 ⁹	
	A2	12.5																		
II-12	A1	7.5	B1	80	C1-1	13	G1	15	D4	30	-	-	-	-	-	500	○	○	2×10 ⁸	
	A2	12.5																		
II-13	A1	35.8	B1	5	C1-1	15	G1	5	-	-	60	-	-	-	-	520	○	○	3×10 ⁹	
	A2	59.2																		
II-14	A1	35.8	B1	5	C1-1	15	G1	5	-	-	40	-	-	-	-	520	○	○	3×10 ⁹	
	A2	59.2																		
II-15	A1	7.5	B1	80	C1-1	15	G1	5	D4	20	-	-	-	-	-	500	○	○	1×10 ⁹	
	A2	12.5																		

The following is clear from the results shown in Tables 2-1 and 2-2.

The molded articles of Examples II-1 to II-15 of the present invention had excellent impact resistance,
5 chemical resistance and antistatic property.

On the other hand, Comparative Example II-1, which used a smaller amount of Component (A) than the inventive range, and a larger amount of Component (B) than the inventive range, had poor impact resistance and
10 antistatic property. Comparative Example II-2, which used a smaller amount of Component (C1) than the inventive range, had poor impact resistance and antistatic property. Comparative Example II-3, which used a larger amount of Component (C1) than the inventive
15 range, had poor impact resistance.

Examples III-1 to III-18 and Comparative Examples III-1 and III-2

All the components were mixed in accordance with the formulations shown in Tables 3-1 and 3-2 by a Henschel
20 mixer. The mixture was then melt-kneaded using a double-screw extruder (cylinder temperature set to 220°C) to obtain pellets. The resultant pellets were sufficiently dried and then injection molded (cylinder temperature set to 220°C) to obtain test pieces for evaluation.

25 The test pieces were used to evaluate impact resistance, chemical resistance, surface appearance of molded articles, and antistatic property, according to

the evaluation methods as described above. The evaluation results are shown in Tables 3-1 and 3-2.

Table 3-1

Example	Formulation														Evaluation Results				
	Component (A)		Component (B)		Component (C1)		Component (C2-1)		Component (D)		Component (E)		Component (F)		Impact resistance-2 (kgf·cm)	Chemical resistance-A1	Chemical resistance-A2	Antistatic property-3 (Ω)	Surface appearance-2 (gloss) (%)
	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts					
III-1	A1 A2	9 11	B1 B2	80 80	C1-1 C1-2	4 4	C2-1-1 C2-1-1	7 7	- -	- -	- -	- -	- -	- -	130 110	○ ○	○ ○	7×10 ⁹ 2×10 ¹⁰	92 95
III-2	A1 A2	9 11	B1 B2	80 80	C1-1 C1-2	4 4	C2-1-1 C2-1-1	7 7	- -	- -	- -	- -	- -	- -	130 140	○ ○	○ ○	7×10 ⁹ 4×10 ⁹	92 90
III-3	A1 A2	9 11	B1 B2	80 80	C1-1 C1-1	4 5	C2-1-2 C2-1-1	7 6	- -	- -	- -	- -	- -	- -	110 150	○ ○	○ ○	9×10 ⁹ 5×10 ⁸	94 86
III-4	A1 A2	9 11	B1 B2	80 80	C1-1 C1-1	2 10	C2-1-1 C2-1-1	9 15	- -	- -	- -	- -	- -	- -	140 140	○ ○	○ ○	5×10 ⁸ 5×10 ⁸	98
III-5	A1 A2	9 11	B1 B2	80 80	C1-1 C1-1	4 4	C2-1-1 C2-1-1	7 7	D1 D2	20 20	- -	- -	- -	- -	420 380	○ ○	○ ○	5×10 ⁹ 5×10 ⁹	92 92
III-6	A1 A2	9 11	B1 B2	80 80	C1-1 C1-1	4 4	C2-1-1 C2-1-1	7 7	D3 D3	20 20	- -	- -	- -	- -	450 480	○ ○	○ ○	5×10 ⁹ 5×10 ⁹	92 94
III-7	A1 A2	9 11	B1 B2	80 80	C1-1 C1-1	4 4	C2-1-1 C2-1-1	7 7	D4 D4	20 20	- -	- -	- -	- -	450 450	○ ○	○ ○	8×10 ⁹ 8×10 ⁹	89
III-8	A1 A2	9 11	B1 B2	80 80	C1-1 C1-1	4 4	C2-1-1 C2-1-1	7 7	D4 D4	10 30	- -	- -	- -	- -	520 480	○ ○	○ ○	1×10 ⁹ 4×10 ⁸	96 94
III-9	A1 A2	9 11	B1 B2	80 80	C1-1 C1-1	4 4	C2-1-1 C2-1-1	7 7	D4 D4	20 20	- -	- -	- -	- -	480 480	○ ○	○ ○	4×10 ⁸ 5×10 ⁸	94 99
III-10	A1 A2	9 11	B1 B2	80 80	C1-1 C1-1	4 4	C2-1-1 C2-1-1	7 7	- -	- -	- -	- -	- -	- -	470 440	○ ○	○ ○	5×10 ⁸ 3×10 ⁸	99 99
III-11	A1 A2	9 11	B1 B2	80 80	C1-1 C1-1	4 4	C2-1-1 C2-1-1	7 7	- -	- -	- -	- -	- -	- -	40	○ ○	○ ○	1×10 ⁸ 1×10 ⁸	62

Table 3-2

		Formulation												Evaluation Results								
		Component (A)		Component (B)		Component (C1)		Component (C2-1)		Component (D)		Component (E)		Component (F)		Component (C2-4)		Impact resistance-2 (kgf/cm)	Chemical resistance-A1	Chemical resistance-A2	Antistatic property-3 (Ω)	Surface appearance-2 (gloss) (%)
Comparative example		III-1	A1	2	B1	98	C1-1	4	C2-1-1	7	-	-	-	-	-	-	30	○	○	5×10 ¹¹	85	
		III-2	A1 A2	9 11	B1	80	C1-1	0.1	C2-1-1	10.9	-	-	-	-	-	-	20	○	○	3×10 ¹³	85	

The following is clear from the results shown in Tables 3-1 and 3-2.

The molded articles of Examples III-1 to III-18 of the present invention had excellent chemical resistance and
5 antistatic property, and the molded articles of Examples III-1 to III-17 also had excellent impact resistance, and surface gloss of molded articles.

Comparative Example III-1, which used a smaller amount of Component (A) than the inventive range, and a larger
10 amount of Component (B) than the inventive range, had poor impact resistance and antistatic property. Comparative Example III-2, which used a smaller amount of Component (C1) than the inventive range, had poor impact resistance and antistatic property.

15 Example IV-1

Specified amounts of the components shown in Table 4 were mixed by a Henschel mixer. The mixture was then melt-kneaded using a double-screw extruder (cylinder temperature set to 220°C) to obtain a pelletized thermoplastic resin
20 composition. As described above, the polyethylene content of Component (C2-3) was listed as B4 in Table 4, since it contained polyethylene corresponding to the Component (B).

Next, the Component (B3) for forming the substrate layer and the thermoplastic resin composition for forming an
25 antistatic layer on the front and back faces of the substrate layer were coextruded at a temperature of 210°C, whereby a 1 mm-thick multilayer sheet was obtained whose substrate layer

was 800 μm thick and antistatic layers were each 100 μm thick. This multilayer sheet was evaluated for surface resistivity (antistatic property), chemical resistance and surface appearance.

- 5 Further, the multilayer sheet was vacuum formed to produce a tray. This tray was evaluated for surface appearance. The results are shown in Table 4.

Examples IV-2 to IV-14

- 10 Thermoplastic resin compositions, sheets and trays were produced in the same manner as in Example IV-1, except that the specified amounts of the components shown in Table 4 were used. Surface resistivity and surface appearance were evaluated. The results are shown in Table 4.

Table 4

		Example													
Raw material component (parts)	Component (A)	IV-1	IV-2	IV-3	IV-4	IV-5	IV-6	IV-7	IV-8	IV-9	IV-10	IV-11	IV-12	IV-13	IV-14
		6	6	6	6	6	8	6	6	5	17		10.6	6	6
Component (B)	A2	11	11	11	11	11	14	11	12	10		17	19.4	11	11
	B1	40	49			40	35	29	45	36	44	44	40	56.97	55.81
	B3			40	40										
	B4*	15.81	7.44	15.81	15.81	15.81	15.81	26.04	15.81	15.81	15.81	15.81	15.81	0.028	
Component (C1)	C1-1	26	26	26		26	26	26	20	32	22	22	13	26	27.19
	C1-2				26										
Component (C2-3)		1.19	0.56	1.19	1.19	1.19	1.19	1.96	1.19	1.19	1.19	1.19	1.19	0.002	
Component (D)	D5	20	20	20	20		20	20	20	20			20	20	20
	D6					20									
(C1) (A) + (B) + (C1) + (D)		0.219	0.219	0.219	0.219	0.219	0.219	0.220	0.168	0.269	0.223	0.223	0.123	0.217	0.227
Charge controlling property-1 (Ω)		3×10 ⁷	3×10 ⁷	1×10 ⁷	8×10 ⁷	3×10 ⁷	3×10 ⁷	2×10 ⁷	5×10 ⁷	=10 ⁷	5×10 ⁷	5×10 ⁷	1×10 ⁹	5×10 ⁸	5×10 ⁸
Impact resistance-1 (kJ/m ²)		15	17	13	12	15	18	13	12	14	5	2	16	-	-
Chemical resistance B	EtOH	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	MEK	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Surface appearance-3		○	○	○	○	○	○	○	○	○	○	○	○	○	○

*: Since the antistatic agent composition containing Component (C2-3) contains polyethylene (corresponding to Component (B)) as a matrix, the polyethylene content is listed in the B4 column.

The following is clear from the results shown in Table 4.

Examples IV-1 to IV-14 of the present invention had low surface resistivity, and excellent charge controlling property, chemical resistance and surface appearance.

The effects on antistatic property resulting from the combination of Component (C1) and Component (C2-3) are clear from comparison between Example IV-1 and Example IV-14. That is, the amounts of Component (C1) and Component (C2-3) in Example IV-1 are respectively 26% and 1.19%, making a total of 27.19%. In contrast, the amounts of Component (C1) and Component (C2-3) in Example IV-14 are respectively 27.19% and 0%, making a total of 27.19%. Therefore, in Example IV-1 and Example IV-14, even though the total content of the Component (C1) and Component (C2-3) which provide antistatic property is the same, it can be seen that Example IV-1, which used Component (C1) and Component (C2-3) together, had a surface resistivity more than 10 times lower and more excellent antistatic property.

Examples V-1 to V-23 and Comparative Examples V-1 to V-5

The components were mixed in accordance with the formulations shown in Tables 5-1 and 5-2 by a Henschel mixer. The mixture was then melt-kneaded using a double-screw extruder (cylinder temperature set to 220°C) to obtain pellets. The resultant pellets were sufficiently dried and then injection molded (cylinder temperature set

to 210°C) to obtain test pieces for evaluation of surface appearance of molded articles.

A three-layer sheet was produced by coextrusion (temperature of 220°C) with an 800 µm-thick sheet of the polymer (B3) for the core layer above and below which was laminated the resin composition in a 100 µm thickness, whereby a 1 mm-thick sheet was obtained. This sheet was cut to form test pieces for evaluation of charge controlling property and chemical resistance.

Using the above evaluation methods, charge controlling property, chemical resistance and surface appearance of molded articles were evaluated.

Trays were further molded by vacuum forming the sheets obtained in Examples V-1, V-4, V-5, V-7 to V-9, V-11, V-21, and V-22 at a preheating temperature of 200°C. The surface resistivity near the corner of the tray was also measured by the same method as the charge controlling property evaluation method.

The evaluation results are shown in Tables 5-1 and 5-2.

Table 5-1

	Formulation										Evaluation results				
	Component (A)		Component (B)		Component (C1)		Component (C2-2)		Component (D)		Tray surface resistivity (Ω)	Chemical resistance C		Surface appearance-1	
	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts		Chemical resistance -C1	Chemical resistance -C2		
Example	V-1	-	B3	80	C1-2	20	C2-2-1	1	-	-	8×10 ⁸	2×10 ⁹	○	○	○
	V-2	-	B1	80	C1-1	20	C2-2-1	1	-	-	9×10 ⁸	-	○	○	○
	V-3	-	B3	84	C1-2	16	C2-2-1	1	-	-	2×10 ⁹	-	○	○	○
	V-4	-	B3	95	C1-2	5	C2-2-1	1	-	-	1×10 ¹¹	3×10 ¹¹	○	○	○
	V-5	-	B3	65	C1-2	20	C2-2-1	1	D2	15	6×10 ⁸	7×10 ⁸	○	○	○
	V-6	-	B3	69	C1-2	16	C2-2-1	1	D2	15	9×10 ⁸	-	○	○	○
	V-7	-	B3	80	C1-2	5	C2-2-1	1	D2	15	4×10 ¹⁰	5×10 ¹⁰	○	○	○
	V-8	-	B3	80	C1-2	5	C2-2-1	1	D4	15	4×10 ¹⁰	5×10 ¹⁰	○	○	○
	V-9	A1 A2	B3	32	C1-2	20	C2-2-1	1	D3	28	5×10 ⁷	3×10 ⁷	○	○	◎
	V-10	A1 A2	B1	32	C1-2	20	C2-2-1	1	D3	28	5×10 ⁷	-	○	○	◎
	V-11	A1 A2	B3	32	C1-2	20	C2-2-1	0.5	D3	28	5×10 ⁷	4×10 ⁷	○	○	◎
	V-12	A1 A2	B3	32	C1-2	20	C2-2-1	0.2	D3	28	7×10 ⁷	-	○	○	◎
	V-13	A1 A2	B3	32	C1-2	20	C2-2-2	1	D3	28	7×10 ⁷	-	○	○	◎
	V-14	A1 A2	B3	32	C1-2	20	C2-2-3	1	D3	38	5×10 ⁷	-	○	○	◎
	V-15	A1 A2	B3	32	C1-2	20	C2-2-1	1	D1	28	5×10 ⁷	-	○	○	◎
	V-16	A1 A2	B3	32	C1-2	20	C2-2-1	1	D2	28	5×10 ⁷	-	○	○	◎
	V-17	A1 A2	B3	32	C1-2	20	C2-2-1	1	D4	28	5×10 ⁷	-	○	○	◎
	V-18	A1 A2	B3	39	C1-2	20	C2-2-1	1	D4	18	5×10 ⁷	-	○	○	◎
	V-19	A1 A2	B3	36	C1-2	16	C2-2-1	1	D4	28	9×10 ⁷	-	○	○	◎
	V-20	A1 A2	B3	28	C1-2	20	C2-2-1	1	D4	20	2×10 ⁷	-	○	○	◎
	V-21	A1 A2	B1	65	C1-1	5	C2-2-1	1	D2	15	9×10 ⁹	8×10 ⁹	○	○	◎
	V-22	A1 A2	B1	65	C1-1	5	C2-2-1	1	D4	15	8×10 ⁹	7×10 ⁹	○	○	◎
	V-23	A1 A2	B3	32	C1-2	20	C2-2-1	0.0005	D3	28	6×10 ⁸	-	○	○	◎

Table 5-2

Comparative Exempl	Formulation										Evaluation results			
	Component (A)		Component (B)		Component (C1)		Component (C2-2)		Component (D)		Charge controlling property-1 (Ω)	Chemical resistance C		Surface appearance-1
	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts		Chemical resistance -C1	Chemical resistance -C2	
V-1	-	-	B3	98	C1-2	2	C2-2-1	1	-	-	$\times 10^{13}$ or more	$\bigcirc$	$\bigcirc$	$\times$
V-2	-	-	B3	60	C1-2	40	C2-2-1	1	-	-	2×10^9	$\times$	$\times$	$\times$
V-3	-	-	B3	80	C1-2	20	C2-2-1	0.0005	-	-	7×10^9	$\bigcirc$	$\bigcirc$	$\bigcirc$
V-4	-	-	B3	80	C1-2	20	C2-2-1	15	-	-	8×10^3	$\times$	$\times$	$\times$
V-5	-	-	B3	30	C1-2	20	C2-2-1	1	D2	50	9×10^3	$\bigcirc$	$\times$	$\times$

Examples V-1 to V-4 and Comparative Examples V-1 to V-3 relate to the second thermoplastic resin composition which comprises Components (B), (C1) and (C2-2) of the present invention as essential components. Examples V-5
5 to V-8 and Comparative Examples V-4 and V-5 relate to the third thermoplastic resin composition which comprises components (B), (C1), (C2-2) and (D) of the present invention as essential components. Examples V-9 to V-23 relate to the first thermoplastic resin composition which
10 comprises Components (A), (B), (C1), (C2-2) and (D) of the present invention as essential components.

The following is clear from the results shown in Tables 5-1 and 5-2.

The molded articles of Examples V-1 to V-23 of the
15 present invention had excellent charge controlling property, chemical resistance and surface appearance of molded articles.

Comparative Example V-1, which used a larger amount of Component (B) than the inventive range, and a smaller
20 amount of Component (C1) than the inventive range, had poor charge controlling property and surface appearance of molded articles. Comparative Example V-2, which used a smaller amount of Component (B) than the inventive range, and a larger amount of Component (C1) than the
25 inventive range, had poor chemical resistance and surface appearance of molded articles. Comparative Example V-3, which used a smaller amount of Component (C2-2) than the

inventive range, had poor charge controlling property. Comparative Example V-4, which used a larger amount of Component (C2-2) than the inventive range, had poor chemical resistance and surface appearance of molded articles. Comparative Example V-5, which used a larger amount of Component (D) than the inventive range, had poor chemical resistance and surface appearance of molded articles.

Examples VI-1 to VI-15 and Comparative Example VI-1

10 The components were mixed in accordance with the formulations shown in Table 6 by a Henschel mixer. The mixture was then melt-kneaded using a double-screw extruder (cylinder temperature set to 220°C) to obtain pellets. The resultant pellets were sufficiently dried and then injection molded (cylinder temperature set to 210°C) to obtain test pieces for impact resistance evaluation.

20 A three-layer sheet was produced by coextrusion (temperature of 220°C) with an 800 µm-thick sheet of the polymer (A1) for the core layer above and below which was laminated the thermoplastic resin composition in a 100 µm thickness, whereby a 1 mm-thick sheet was obtained. This sheet was cut to form test pieces for evaluation of charge controlling property, sustainability of charge controlling property, and chemical resistance. The results for each of the evaluations are shown in Table 6.

Table 6

	Formulation											Evaluation results						
	Component (A)			Component (B)			Component (C1)		Component (D)		Component (C2-4)		Component (C2-2)	Charge controlling property-2 (Ω)	Sustain-ability of charge controlling property	Chemical resistance-C1	Impact resistance-3 (kgf-cm)	
	Kind	Parts	Kind/Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind	Parts	Kind						Parts
Example	VI-1	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-1	1(10)	-	3×10 ⁶	○	○	210
	VI-2	A1	7	A2	I1	B3	36	C1-2	16	D4	30	C2-4-1	1(10)	-	5×10 ⁶	○	○	180
	VI-3	A1	7	A2	I1	B1	36	C1-1	16	D4	30	C2-4-1	1(10)	-	5×10 ⁶	○	○	210
	VI-4	A1	7	A2	I1	B1	36	C1-2	16	D3	30	C2-4-1	1(10)	-	3×10 ⁶	○	○	180
	VI-5	A1	7	A2	I1	B1	36	C1-2	16	D2	30	C2-4-1	1(10)	-	3×10 ⁶	○	○	170
	VI-6	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-2	1(2)	-	6×10 ⁶	○	○	230
	VI-7	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-1	0.5(5)	-	7×10 ⁶	○	○	210
	VI-8	A1	7	A2	I1	B1	42	C1-2	10	D4	30	C2-4-1	1(10)	-	6×10 ⁷	○	○	230
	VI-9	A1	7	A2	I1	B1	32	C1-2	20	D4	30	C2-4-1	0.2(2)	-	4×10 ⁶	○	○	170
	VI-10	A1	7	A2	I1	B1	42	C1-2	10	D4	30	C2-4-1	1(10)	C2-2-1	8×10 ⁶	○	○	230
	VI-11	A1	7	A2	I0	B1	52	C1-2	16	D3	15	C2-4-1	1(10)	-	3×10 ⁶	○	○	220
	VI-12	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-2	1(2)	C2-2-1	2×10 ⁶	○	○	230
	VI-13	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-2	1(2)	C2-2-1	2×10 ⁶	○	○	230
	VI-14	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-2	1(2)	C2-2-1	2×10 ⁶	○	○	230
	VI-15	A1	7	A2	I1	B1	36	C1-2	16	D4	30	C2-4-1	0.001 (0.01)	-	5×10 ⁵	○	○	210
Comparative example	VI-1	A1	7	A2	I1	B1	12	C1-2	40	D4	30	C2-4-1	1(10)	-	3×10 ⁶	○	×	30

: The values outside the brackets of component (C2-4) denote the loading parts as a lithium salt, while the values inside the brackets denote the loading parts as the master batch.

The following is clear from the results shown in Table 6.

The molded articles of Examples VI-1 to VI-15 had excellent charge controlling property, sustainability of charge controlling property, chemical resistance and impact resistance. The molded articles of Examples VI-1 to VI-14 had especially excellent charge controlling property.

On the other hand, Comparative Example V-1, which used a larger amount of Component (C1) than the inventive range, had poor chemical resistance and impact resistance.

INDUSTRIAL APPLICABILITY

The thermoplastic resin composition according to the present invention is more excellent than prior art in impact resistance, chemical resistance, surface appearance of molded articles and antistatic property or charge controlling property, and can be used as various parts in fields requiring high performance, such as the fields of vehicles, electrics or electronics, office automation or home appliances, and sanitary care.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic cross-sectional view illustrating a molded article having a two-layer structure as a multilayer molded article of the present invention; and

Figure 2 is a schematic cross-sectional view illustrating a molded article having a three-layer structure as a multilayer molded article of the present invention.

5 DESCRIPTION OF SYMBOLS

1: Two-layer molded article

11: Substrate layer

12, 12a and 12b: Antistatic layer

2: Three-layer molded article

CLAIMS

1. A thermoplastic resin composition comprising 5 to 95%
by mass of the following Component (A) and 95 to 5% by mass
5 of the following Component (B) (with the total of Component
(A) and Component (B) being 100% by mass), and

further comprising 0.5 to 100 parts by mass of the following
Component (C1) per 100 parts by mass of the total of Component
(A) and Component (B), and further comprising at least one
10 component selected from the group consisting of the following
Component (D), Component (E), Component (F) and Component (G)
in an amount of 1 to 200 parts by mass per 100 parts by mass
of the total of Component (A) and Component (B), wherein:

Component (A): a styrene resin resulting from
15 (co)polymerization of an aromatic vinyl compound, or an
aromatic vinyl compound and another vinyl monomer
copolymerizable with the aromatic vinyl compound in a presence
or absence of a rubber-like polymer, excluding the following
Component (D);

20 Component (B): an olefin resin,

Component (C1): a block copolymer comprising an olefin
polymer block (c1-1) and a hydrophilic polymer block (c1-2);

Component (D): at least one polymer selected from the group

consisting of a block copolymer (D-a) comprising a polymer block (d-1) mainly consisting of an aromatic vinyl compound and a polymer block (d-2) mainly consisting of a conjugated diene compound, and a hydrogenated product (D-b) thereof;

5 Component (E): a graft polymer resulting from (co)polymerization of an aromatic vinyl compound, or an aromatic vinyl compound and another vinyl monomer copolymerizable with the aromatic vinyl compound in a presence of the Component (D);

10 Component (F): an aromatic polycarbonate block copolymer comprising a polymer block (f-1) consisting of the Component (D), and an aromatic carbonate polymer block (f-2); and

 Component (G): a low molecular weight polyolefin modified with an unsaturated acid and/or unsaturated acid
15 anhydride.

2. The thermoplastic resin composition according to claim 1, further comprising at least one component selected from the group consisting of the following Component (C2-1),
20 Component (C2-2), Component (C2-3) and Component (C2-4) in an amount of 0.001 to 60 parts by mass per 100 parts by mass of the total of Component (A) and Component (B), wherein:

 Component (C2-1): a polyetherpolyamide and/or

polyetherpolyester;

Component (C2-2): a nonionic antistatic agent;

Component (C2-3): a boron compound; and

Component (C2-4): a lithium salt.

5

3. A molded article formed of the thermoplastic resin composition according to claim 1 or 2.

4. The molded article according to claim 3 which is a sheet
10 or a film.

5. A multilayer molded article comprising a substrate to which a sheet or film formed of the thermoplastic resin composition according to claim 1 or 2 is laminated onto at least
15 one surface of the substrate.

6. The multilayer molded article according to claim 5, wherein the substrate is a sheet or film formed of an olefin resin.