

USES AND COMPOSITIONS OF DIFLUOROMETHOXY -2,2,2- TRIFLUOROETHANE

The present invention relates to new uses of difluoromethoxy-2,2,2-trifluoroethane (E245), and to compositions which contain E245. A process for fixing toner applied to a recording material by means of fixing vapour based on E245 is described as a preferred use; in this process, E245 is used as such or as a mixture with a cosolvent.

In a known printing or copying system, a charge image (negative image) is first produced on a photoconductor drum by exposure of the print or copy master to light and is developed in a subsequent developer station, i.e. the charge image is provided with toner. The developed charge images on the photoconductor drum then pass to a transfer station. By means of an electrostatic field which exists in the transfer station, the toner image is pulled over onto a recording carrier, for example a web of paper or an individual sheet, fed to the transfer station. The toner image now adheres to the surface of the recording carrier, although it can be wiped off. The recording carrier provided with the toner image (positive image) is then passed through a fixing device. A solvent vapour required for fixing the toner is generated in this fixing device. For this, the solvent is located at the base of the housing of the fixing device. The base of the fixing device is heated by means of a heating device, so that the solvent vaporizes from the base. The solvent vapour thereby generated acts on the recording carrier, and in particular on the toner applied thereto. In this process, so-called cold fixing, the solvent vapour thus ensures intimate contact between the toner and the recording material. The toner is thereby partially dissolved, so that it can penetrate into the recording carrier. After this fixing operation, the recording carriers are freed from any still adhering residues of the solvent vapour by drying, and a dry, firmly adhering

toner image, which cannot be wiped off, is obtained on the recording carrier.

Solvents for fixing the toner must meet particular requirements. Such solvents should have a relatively low boiling point and be non-flammable and essentially non-toxic, and should have favourable dissolving properties for, for example, toner particles which are applied to a recording material and are to be fixed by partial dissolving. As a rule, these requirements cannot be met by only a single solvent. A large number of solvent mixtures with more or less different compositions are therefore used in practice.

In the prior art, it is also known (for example in the field of industrial cleaning processes or in vapour degreasing) to employ mixtures of chlorofluorohydrocarbons (as the main solvent) with a cosolvent, in addition to pure chlorinated and/or fluorinated hydrocarbons. Such mixtures can be either non-azeotropic or azeotropic or azeotrope-like. The term "azeotrope-like" here means that the mixtures have an essentially constant boiling point (change in the boiling point of not more than 5°C) over a relatively wide mixing and concentration range. Such azeotrope-like mixtures therefore behave like azeotropes when used in practice. Those solvent mixtures which have a constant boiling point (maximum variation $\pm 0.5^{\circ}\text{C}$) and which, on boiling, contain the solvent components of the mixture in the same relative composition in the vapour phase as in the liquid phase are regarded as azeotropes.

Solvent mixtures which are suitable for use in fixing devices of printing and copying apparatus as a rule comprise at least two solvent components, at least one component of which must have properties of partially dissolving the toner. Since these solvent mixtures act on the toner in the vapour state in modern fixing devices, as uniform a vaporization as possible of the

solvent mixtures is required, i.e. the solvent mixtures should vaporise without separation into their components or at least without relatively large shifts in the ratios of the amounts of the components in the vapour phase relative to the liquid phase. The solvent mixtures employed in the fixing device thus expediently have at least azeotrope-like, but in particular azeotropic boiling properties so that a constantly good fixing of the toner on the recording material can also be ensured over relatively long periods of use.

The use of solvents in the fixing devices of printing or copying apparatus has already been described, for example, in German Patent Specification DE 28 35 284; azeotropic mixtures of trichlorotrifluoroethane (R113) and acetone are proposed there. This specification also contains further details on the progress of fixing of the toner in the context of the printing and copying operation. Another process using partly halogenated chlorofluorohydrocarbons is described in WO 93/10485; 2,2-dichloro-1,1,1-trifluoroethane (R123) and 1,1-dichloro-1-fluoroethane (R141b) are proposed as the main solvent. Disadvantages are, however, that on the one hand the R123 proposed is not completely acceptable toxicologically under certain circumstances, and on the other hand R141b may have incompatibilities with materials which may limit its use.

Although some efforts have already been made in the prior art to discover alternative compositions having the desired properties as substitutes for the completely halogenated hydrocarbons used to date, there is still a need for improvement on the basis of the use properties, toxicological properties and properties which influence the environment. For example, known solvent mixtures comprise relatively large contents of solvents which are unacceptable toxicologically and from environmental aspects, as well as safety aspects (low flash point) in

some cases. For a number of solvent constituents, substitution by other solvents which are at least equally suitable for the particular intended uses is desirable because of their environment-influencing properties.

5 In view of the state of the art, it would be useful to discover solvents and solvent mixtures which are especially suitable, in particular, for use as toner solvents in the fixing device of printing and copying apparatus.

10 To achieve this object, the invention proposes the use of difluoromethoxy-2,2,2-trifluoroethane as a solvent for fixing toner particles applied to a recording material, for example in the fixing device of printing and copying apparatuses and in particular laser printers.

15 Difluoromethoxy-2,2,2-trifluoroethane, which is also known as E245, can be prepared, for example, by reaction of trifluoroethanol with chlorodifluoromethane, as described, for example, in US Patent 3,761,524.

It has been found, according to the invention,
20 that E245 has favourable solvent properties in respect of the above use and the further uses also described below. E245 shows favourable swelling properties on various plastics and also on elastomers. Organic substances of a polar nature are readily soluble in E245. E245
25 furthermore is also suitable for uses where the addition of non-polar additives is desirable; in this case, the solubility of the non-polar additives can be improved by suitable solubilizing agents. Furthermore, E245 is readily compatible with many plastics which are attacked
30 by the completely and partly halogenated chlorofluoro-hydrocarbons used to date in the prior art. Furthermore, E245 is non-combustible and has no flash point. The boiling point of E245 under atmospheric pressure is 29°C.

35 The difluoromethoxy-2,2,2-trifluoroethane used according to the invention is therefore suitable as such

for fixing, in particular for fixing polar toner particles; however, usable fixing results can also be achieved with non-polar toner particles using difluoromethoxy-2,2,2-trifluoroethane as the solvent. The
5 fixing properties can be improved, as compared with the use of E245 itself, by the addition of cosolvents and if appropriate also by addition of solubilizing agents (for example in the case of non-polar additives). In a preferred embodiment of the invention, E245 is therefore
10 used as the main solvent in combination with a cosolvent. Such cosolvents can be, in particular, the cosolvents contained in customary fixing solvents.

E245 is also particularly suitable as a mixture with cosolvents for other uses, for example cleaning
15 uses. The cosolvents for the fixing use are expediently chosen from lower alcohols, ketones, esters and, where appropriate, the chlorinated hydrocarbons (CHCs). In addition to the abovementioned cosolvents, glycols are also suitable for cleaning uses.

20 Examples of lower alcohols which are suitable as cosolvents are, in particular, C1- to C3-alcohols, for example methanol, ethanol, propanol and isopropanol. Suitable ketones include, in particular, the C3- to C6-ketones; for example acetone, methyl ethyl ketone and
25 methyl isobutyl ketone; acetone is the preferred ketone. As useful esters, the esters of C2- to C3-carboxylic acids with lower alcohols (C1- to C3-alcohols) are to be mentioned in particular; for example, esters of acetic acid or propionic acid with the C1- to C2-alcohols
30 methanol or ethanol are advantageous. Preferred esters are, for example, methyl acetate and ethyl acetate, but also methyl propionate. Useful chlorinated hydrocarbons are low molecular weight hydrocarbons, i.e. C1- to C2-hydrocarbons, which are substituted by one or more
35 chlorine atoms. If appropriate, the chlorinated hydrocarbons can also additionally carry fluorine atoms.

Preferred chlorinated hydrocarbons (CHCs) for the use according to the invention as cosolvents for E245 are methylene chloride and trichloroethylene. Useful glycols (only for cleaning uses) include, in addition to the
5 parent compound ethylene glycol, the generic diols in which the hydroxyl groups are in the vicinal arrangement (1,2-diols), and also those compounds with non-adjacent OH groups as well as those compounds in which one of the two OH groups is etherified by a C1- to C4-alkyl radical.
10 The glycols employed according to the invention contain two to ten carbon atoms. Examples of glycols which can be used according to the invention are ethylene glycol, propylene glycols and butylene glycols, and in particular butylglycol (2-butoxy-ethanol).

15 For use according to the invention of binary compositions of E245 as the main solvent and of lower alcohols, ketones, esters and CHCs as cosolvent for fixing toner particles, those binary compositions which have at least azeotrope-like, but more especially
20 azeotropic properties are preferred. In general, the cosolvent is then present in an amount of 0.2 to 5.0% by weight, in particular 0.3 to 5.0% by weight, and the main solvent E245 correspondingly in an amount of 99.8 to 95.0% by weight, more especially 99.7 to 95.0% by weight.
25 In azeotropic binary compositions, the amount of cosolvent is between 0.3 and 3.0% by weight, depending on its nature, and the amount of E245 is accordingly 99.7 to 97.0% by weight. The sum of the constituents here in each case adds up to 100% by weight. Such azeotrope-like
30 and azeotropic compositions can be determined by distillation experiments with a mixture of the main solvent and cosolvent and subsequent analysis of the particular composition of the vapour and liquid phase.

Binary azeotrope-like compositions of E245 and
35 lower alcohols are already described in European Patent Application 0 600 538 A1 for cleaning electronic

components and for degreasing metal components; the content of EP 0 600 538 A1 is therefore expressly referred to in respect of the preparation of azeotrope-like and azeotropic compositions of E245 and lower
5 alcohols and of the amount ranges of the two components disclosed for this purpose. For example, an azeotropic composition mentioned therein comprises about 97% by weight of E245 and about 3% by weight of methanol; the boiling point under atmospheric pressure (1 bar) is about
10 29.3°C. Another azeotropic composition comprises 99.7% by weight of E245 and 0.3% by weight of ethanol; the boiling point is 74.9°C under 4 bar.

In contrast, the binary compositions of E245 and the cosolvents selected from ketones, esters and
15 chlorinated hydrocarbons used according to the invention for fixing toners have not been described to date in the prior art. It has also been found that the compositions of E245 with the above cosolvents are also suitable for solvent and cleaning uses, in addition to their use for
20 fixing toners. It has furthermore also been found that compositions of E245 with a glycol cosolvent are particularly suitable for cleaning uses.

The invention therefore also relates to new compositions comprising difluoromethoxy-2,2,2-trifluoro-
25 ethane and a cosolvent selected from ketones, esters, chlorinated hydrocarbons and glycols. Preferably, the compositions have a content of 99.8 to 50.0% by weight of difluoromethoxy-2,2,2-trifluoroethane and 0.2 to 50.0% by weight of the cosolvent. Particularly preferred
30 compositions for cleaning uses comprise 99.8 to 90.0% by weight of difluoromethoxy-2,2,2-trifluoroethane and 0.2 to 10.0% by weight of a cosolvent selected from ketones, esters, chlorinated hydrocarbons and glycols. In the
35 case of cosolvents selected from ketones, esters and CHCs, the resulting compositions with E245 in some cases also already show usable results in respect of fixing of

toner particles. Compositions which comprise cosolvent selected from ketones, esters and CHCs in an amount of 0.2 to 5.0% by weight, in particular 0.3 to 5.0% by weight, and the main solvent E245 correspondingly in an amount of 99.8 to 95.0% by weight, in particular 99.7 to 95.0% by weight, are favourable here. Preferably, the cosolvent is present in an amount of 0.3 to 5.0% by weight; the amount of E245 is then 99.7 to 95.0% by weight. The sum of the constituents of the above compositions in each case adds up to 100% by weight.

Particularly preferred compositions for cleaning uses are compositions according to the invention of difluoromethoxy-2,2,2-trifluoroethane and a glycol, preferably butylglycol.

Preferred compositions which are outstandingly suitable for the use according to the invention for fixing toner particles comprise, in addition to the main solvent difluoromethoxy-2,2,2-trifluoroethane, a cosolvent selected from ketones, preferably acetone.

In a particularly advantageous embodiment of the invention, the compositions of difluoromethoxy-2,2,2-trifluoroethane and acetone are distinguished by azeotrope-like or in particular azeotropic properties. Such azeotrope-like or azeotropic compositions of solvents have a number of advantages in their use. On the one hand, they have a constant or essentially constant boiling point (variations in the boiling point are not more than about $\pm 0.5^{\circ}\text{C}$), and on the other hand the composition of the mixtures thereby also remains constant or essentially constant. When azeotropic or azeotrope-like compositions are used, there is thus no fractionation of the solvent constituents of the compositions, which means that undesirable changes in properties, such as, for example, a changed dissolving power, reduced inertness towards objects to be cleaned or

increased flammability if ignitable cosolvents are used, are avoided. Furthermore, azeotropic or azeotrope-like compositions can easily be purified by customary distillation after use and are therefore available in a simple manner for re-use, without the characteristics of the original composition being lost.

It has now been found that some compositions of E245 and acetone according to the invention have very narrow boiling ranges and therefore have at least azeotrope-like properties. These special azeotrope-like compositions comprise 99.5 to 95.0% by weight of difluoromethoxy-2,2,2-trifluoroethane (E245) as a mixture with 0.5 to 5.0% by weight of acetone, these compositions boil in a range from 28.5 to 33.0°C (atmospheric pressure = 1 bar). The azeotropic composition with about 97.2% by weight of difluoromethoxy-2,2,2-trifluoroethane and 2.8% by weight of acetone, which has a boiling point of about 28.5°C under atmospheric pressure, is particularly favourable here.

The azeotropic and azeotrope-like compositions of difluoromethoxy-2,2,2-trifluoroethane and acetone according to the invention have favourable dissolving properties. As a result, as well as being suitable as solvents in fixing devices of printing and copying apparatuses, they are also suitable for other intended uses, for example as solvents.

The compositions of E245 and acetone according to the invention are clear solutions at room temperature, to which additives known per se can be added (the relative ratio of difluoromethoxy-2,2,2-trifluoroethane to acetone specified by the above % by weight data is not thereby changed). Additives which are known per se can likewise also be added to the other compositions according to the invention of E245 and a cosolvent selected from ketones, esters, CHCs and glycols as well as to the compositions of E245 and lower alcohols (the

relative ratio of E245 to the cosolvent is likewise retained here). Examples of such additives for all these compositions are described below.

Stabilizers are a group of additives which are known per se. This group comprises those compounds which prevent an undesirable reaction of constituents of the composition with one another or with other reaction partners, such as, for example, atmospheric oxygen, metal, water and the like. Known stabilizers are, for example, nitroalkanes, in particular nitromethane and nitroethane, alkylene oxides, in particular butylene oxide, or branched alkynols, such as, for example, 2-methyl-but-3-yn-2-ol. These stabilizers can be employed by themselves or in combination with one another, amounts of 0.01 to 5% by weight, preferably 0.05 to 1% by weight, based on the total mixture, being particularly suitable.

Another group of useful additives comprises compounds which are known per se selected from corrosion inhibitors, nonionic or ionic emulsifiers, dyestuffs and the like.

The compositions according to the invention also are useful for cleaning and/or vapour degreasing, especially in the case of glycols being used as cosolvents. In these processes, which are known per se, the object to be cleaned is dipped in liquid and/or vaporous cleaning mixture or sprayed with liquid cleaning mixture in one or more stages. The cleaning action can often be increased by use of the cleaning agent at boiling point and/or the application of ultrasound and/or stirring. Improvement in the cleaning action by a mechanical action, such as, for example, brushing, is also known.

For example, the electronic industry predominantly uses organic resin fluxes for soldering processes, and the excesses thereof must be removed from

printed circuit boards after the soldering operation. This is done with organic solvents which are compatible with the printed circuit boards and the electronic components, i.e. the solvent must not react with these.

5 The resin fluxes to be removed are mixtures of polar and non-polar compounds and often additionally comprise special activators. Difluoromethoxy-2,2,2-trifluoroethane by itself is not effective for removal of the polar components of the resins. It is also not capable
10 by itself of completely removing special fluxes of high activator content in particular. Surprisingly, however, the compositions according to the invention of E245 and glycols, for example butylglycol, can remove both the polar and the non-polar components and are therefore
15 effective as removal agents for resin fluxes, in particular those having a high activator content.

Unassembled and assembled printed circuit boards (including in particular those with SMDs) can thus also be cleaned without problems with the compositions
20 according to the invention of E245 and butylglycol (2-butoxy-ethanol) if fluxes having a high activator content are used, without the "white deposits" feared from the use of customary cleaning agents occurring.

The new azeotrope-like and azeotropic
25 compositions according to the invention, in particular those with acetone as a cosolvent, are particularly favourable systems for fixing toners to recording carriers in printing and copying apparatuses (with the exception of the compositions with glycols as the
30 cosolvent). The compositions according to the invention used for this purpose can also comprise stabilizers.

The compositions according to the invention, in particular the azeotrope-like or azeotropic compositions of E245 and acetone, in particular very readily partially
35 dissolve dry toners based on polystyrene. Such toners can have, for example, a non-crosslinked polymer matrix,

for example of polystyrene and methacrylates. The compositions according to the invention, in particular of E245 and acetone, are outstandingly suitable for use for fixing toners, in particular in modern laser printers.

5 They are also suitable if the recording carrier has a high degree of coloration, and in particular are also readily compatible with all the customary grades of paper. Problems of underfixing such as are often observed with fixing solvents of the prior art are
10 avoided. Furthermore, the compositions according to the invention, in particular the azeotrope-like and azeotropic compositions of E245 and acetone - as well as the compositions of E245 and C1- to C3-alcohols or of E245 and CHCs - have very good partial dissolving
15 properties for toners, in particular for dry toners based on polystyrene. The compositions according to the invention and those used according to the invention are capable of very readily partially dissolving the toner particles on the one hand, without on the other hand
20 leading to an undesirable running of the toner on the recording carrier. It is thereby possible to produce on the recording carrier firmly adhering images which cannot be wiped off and have a high resolution and sharpness.

The compositions according to the invention
25 with E245 which comprise special cosolvents, for example glycols, can possess to a great extent the high degree of purity which is required in special fields of use, for example for cleaning components and printed circuit boards in the electronics industry.

30 Another advantage of the compositions according to the invention is their favourable flashpoint properties, which can be tested, for example, via the "closed crucible" method. It furthermore proves to be advantageous that the solvent employed, that is to say
35 difluoromethoxy-2,2,2-trifluoroethane is degraded significantly more easily than completely halogenated

chlorofluorohydrocarbons and has a low global warming potential, that is to say is more environment-friendly.

The invention is illustrated by the non-limiting Example which follows, and by reference to
5 Figure 1 of the accompanying drawings. Unless stated otherwise, % refers to % by weight.

Figure 1 is a sketch illustrating the principles of operation at a cold fixing station in a printing or copying apparatus. The reference
10 numerals show the following:

- (1) = web of paper charged with toner
- (2) = cold trap
- (3) = vapour chamber
- (4) = solvent vaporization
- 15 (5) = solvent return
- (6) = heating
- (7) = vapour sensor (ultrasound) for measurement of the vapour concentration
- (8) = winding up unit

20 The compositions proposed according to the invention for use as solvents for fixing toner particles can be tested for their suitability in principle for fixing with a cold fixing station having the basic features shown diagrammatically in Figure 1. For this,
25 a web of paper is charged with a toner based on polystyrene, for example in the form of a pattern or a sequence of numbers or letters (for example a sequence of symbols of a particular type of script). This charging can be done in a manner known per se, for example in
30 which charge images formed by the electrostatic principle are first developed in a developer station with the aid of toner powder to give "toner images", and these toner images are then transferred to a recording carrier (for example a web of paper) in a transfer station. These

toner images adhere loosely to the recording carrier and must then be "fused into" the recording carrier by partial dissolution in order to ensure smudge-free fixing. The toner is fused into the web of paper (= recording carrier) with the aid of the solvent vapour (E245 or mixtures of E245 with one of the cosolvents described hereinabove for this purpose in an azeotrope-like or azeotropic composition). For this purpose there is generated a solvent vapour which is capable of partially dissolving the toner on the recording carrier, which means that the toner can then penetrate adequately into the recording carrier. To accomplish this, the recording material provided with the toner image is fed into a fixing device, for example as illustrated in Figure 1, in which the solvent vapour can then act on the recording material. Such a fixing device comprises, for example, a housing with a feed device for the recording carrier which serves to pass the recording carrier through the housing. A fixing device furthermore comprises a vaporization station in which the solvent vapours can be held as far as possible without an escape. The entry and exit points of the fixing device are therefore provided with cold traps and seals. The vaporization and fixing agent concentration is regulated by control mechanisms which are customary per se.

The solvent vapours based on E245 used according to the invention show good partial dissolving properties for toners. The toner can in each case be readily "fused into" (fixed in) the recording material without the edges running. Images which are fixed well (smudge-free) and have a good sharpness can be produced on the recording materials.

Example 1Cleaning of printed circuit boards

Cleaning experiments with printed circuit boards which were contaminated both with customary
5 halogen-containing solder fluxes and with solder fluxes of high activator content were carried out in a commercially available 3-chamber cleaning unit. Both the contamination by customary halogen-containing solder
fluxes and that by solder fluxes of high activator
10 content could be removed from the printed circuit boards with outstanding cleaning results. The cleaning compositions, cleaning conditions and cleaning results are shown in Table 1.

Table 1:

No.	Compositions for bath 1	Cleaning conditions	Result
1	E245/butylglycol: 90.0%/10.0%	3-bath: 1) 3 minutes ultrasound 2) 1 minute ultrasound 3) 1 minute vapour degreasing (in bath 2 and 3: E245)	++
2	E245/butylglycol: 95.0%/5.0%	3-bath: 1) 3 minutes ultrasound 2) 1 minute ultrasound 3) 1 minute vapour degreasing (in bath 2 and 3: E245)	++

5 The notation "++" in the "Result" column indicates that a very good cleaning action has been achieved and that there was no formation of "white deposits". It can easily be seen that the exemplified compositions according to the invention have outstanding cleaning

10 properties.

**CLAIMS:**

1. Use of a composition comprising difluoromethoxy-2,2,2-trifluoroethane (E245) for fixing a toner applied to a recording material.
2. Use according to Claim 1, wherein the composition further comprises a cosolvent.
3. Use according to Claim 1 or 2, wherein the cosolvent is selected from lower alcohols, ketones, esters and chlorinated hydrocarbons.
4. Use according to Claim 3, wherein the cosolvent is a ketone.
5. Use according to Claim 4, wherein the ketone is acetone.
6. Use according to any one of Claims 2-5, wherein the composition comprises the cosolvent in an amount of 0.2 to 5.0% by weight and the main solvent E245 corresponding in an amount of 99.8 to 95.0% by weight, the sum of the solvent constituents being 100% by weight.
7. Use according to Claim 6, wherein the composition comprises 0.3 to 5.0% by weight of the cosolvent and correspondingly from 99.7 to 95.0% by weight of E245.
8. Use according to any one of Claims 2-7, wherein E245 is employed in an azeotrope-like or azeotropic composition with a cosolvent.
9. Use according to Claim 8, wherein an azeotropic binary composition of 97.2% by weight of E245 and of 2.8% by weight of acetone as a cosolvent is employed.



10. Use according to any preceding claim, wherein the toner is based on polystyrene.

11. Use according to any preceding claim, for fixing a toner in a laser printer.

12. A process for fixing a toner applied to a recording carrier, wherein a composition as defined in any preceding claim is vaporized and the resulting vapor is caused to act on the toner to partially dissolve it and thereby cause it to become fixed to the recording carrier.

13. A process according to Claim 12, wherein the toner is based on polystyrene, and the composition is as defined in Claim 8, optionally may contain a stabilizer and is contained in the fixing device of a printing or copying apparatus.

14. A composition comprising difluoromethoxy-2,2,2-trifluoroethane (E245) and a cosolvent selected from ketones, esters, chlorinated hydrocarbons and glycols.

15. A composition according to Claim 14, comprising from 99.8 to 50.0% by weight of E245 and correspondingly 0.2 to 50.0% by weight of the cosolvent, the sum of the solvent constituents being 100% by weight.

16. A composition according to Claim 15, comprising from 99.8 to 90.0% by weight of E245 and correspondingly from 0.2 to 10.0% by weight of the cosolvent.

17. A composition according to Claim 16, comprising from 99.8 to 95.0% by weight of E245 and correspondingly from 0.2 to 5.0% by weight of the cosolvent.



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18. A composition according to any one of Claims 14-17, wherein the cosolvent is a ketone.
19. A composition according to Claim 18, wherein the cosolvent is acetone.
20. A composition according to Claim 19, which is an azeotrope-like or azeotropic composition of 99.5 to 95.0% by weight of E245 and correspondingly 0.5 to 5.0% by weight of acetone.
21. A composition according to Claim 20, which is an azeotropic composition of about 97.2% by weight of E245 and about 2.8% by weight of acetone.
22. A composition according to any one of Claims 14-21, comprising also from 0.01 to 5% by weight of a stabilizer, based on the total mixture.
23. A composition according to Claim 23, comprising from 0.05 to 1% by weight of a stabilizer selected from nitroalkanes, alkylene oxides and alkynols.
24. A process for cleaning a surface, wherein the surface is treated with a composition according to any one of Claims 14-23.
25. A process according to Claim 24, wherein the surface to be cleaned is a printed circuit board contaminated with solder flux or solder flux residues.
26. A process according to Claim 24 or Claim 25, wherein the surface is treated with a composition comprising E245 and a glycol cosolvent.
27. A process according to Claim 26, wherein the glycol is butylglycol.

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28. Use of a composition comprising E245, according to Claim 1 and substantially as hereinbefore described with reference to the accompanying drawing.

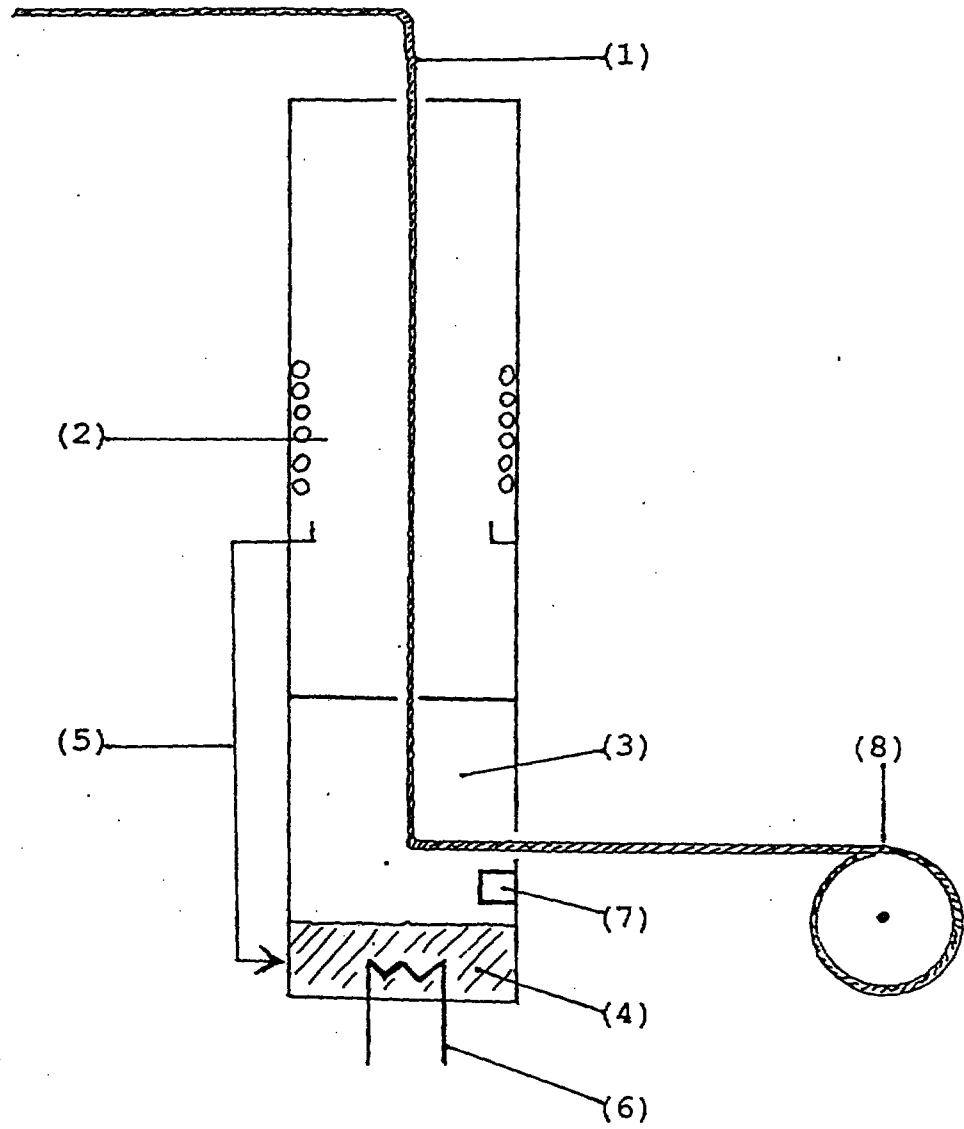
29. A composition according to Claim 14 and substantially as described in the Example herein.



USES AND COMPOSITIONS OF DIFLUOROMETHOXY -2,2,2- TRIFLUOROETHANE

Abstract

The present invention relates to new uses of difluoromethoxy-2,2,2-trifluoroethane (E245) and to compositions which comprise a further solvent (cosolvent) in addition to difluoromethoxy-2,2,2-trifluoroethane. The invention furthermore relates to new compositions of E245 as a mixture with some of these solvents. A process for fixing toner applied to a recording material by means of fixing vapour based on E245 is described as a preferred use; in this process, E245 is used as such or as a mixture with a cosolvent.

Fig. 1

USES AND COMPOSITIONS OF DIFLUOROMETHOXY -2,2,2- TRIFLUOROETHANE

Abstract

The present invention relates to new uses of difluoromethoxy-2,2,2-trifluoroethane (E245) and to compositions which comprise a further solvent (cosolvent) in addition to difluoromethoxy-2,2,2-trifluoroethane. The invention furthermore relates to new compositions of E245 as a mixture with some of these solvents. A process for fixing toner applied to a recording material by means of fixing vapour based on E245 is described as a preferred use; in this process, E245 is used as such or as a mixture with a cosolvent.

Fig. 1



18. A composition according to any one of Claims 14-17, wherein the cosolvent is a ketone.
19. A composition according to Claim 18, wherein the cosolvent is acetone.
20. A composition according to Claim 19, which is an azeotrope-like or azeotropic composition of 99.5 to 95.0% by weight of E245 and correspondingly 0.5 to 5.0% by weight of acetone.
21. A composition according to any one of Claim 20, which is an azeotropic composition of about 97.2% by weight of E245 and about 2.8% by weight of acetone.
22. A composition according to any one of Claims 14-21, comprising also from 0.01 to 5% by weight of a stabilizer, based on the total mixture.
23. A composition according to Claim 23, comprising from 0.05 to 1% by weight of a stabilizer selected from nitroalkanes, alkylene oxides and alkynols.
24. Use of a composition comprising E245, according to Claim 1 and substantially as hereinbefore described with reference to the accompanying drawing.
25. A composition according to Claim 14 and substantially as described in the Example herein.