

COMPOSITIONS WITH DIFLUOROMETHOXY-2,2,2-TRIFLUOROETHANE

The present invention relates to liquid or pasty compositions which contain in particular difluoromethoxy-2,2,2-trifluoroethane (E245) as solvent and at least one agent having release-effective properties, and also to the use of these compositions and a method for the preparation thereof.

In many industrial fields of application which comprise operating processes such as casting, moulding, pressing etc. - e.g. for the production and processing of plastics, foamed materials, building materials, rubber articles, tyres, metals, glass, ceramic products etc., nowadays release agents, lubricants or parting agents are required. Release agents in this context are solid or liquid films which reduce the adhesive forces between two adjoining surfaces, i.e. prevent the agglutination thereof. Lubricants are additives for plastic compounds, e.g. compression-moulding compounds and injection-moulding compounds. They are required to make the fillers slide more easily and thus to make the compression-moulding compounds easier to deform. The release agents, lubricants or parting agents contain release-effective constituents, e.g. in the form of dry powders, dry films or wet films, pastes, burned-in films, solutions or dispersions. One special form is represented by the so-called internal release-effective components which are mixed into the material which is to be demoulded and are either capable of concentrating at the surface or of bringing about more rapid hardening of the surface, so that there is no bond between the mould wall and the moulded part.

Often in the above operating processes the residues of the agent having release-effective properties have to

be removed from time to time from the mould with the aid of solvents. Usually solvents such as hydrocarbons and chlorohydrocarbons are used for cleaning the moulds, the former of which are a fire hazard and the latter of which can cause skin irritation.

According to a method disclosed by German Offenlegungsschrift DE 25 52 236, a mould release agent for the production of moulded rubber products and the shaping of polyurethane foam material is known. The mould release compound used therein contains paraffin wax, lamp oil and sodium soaps of talloleic acids in a paraffinic base oil. The mould release agent used must be soluble or emulsifiable in water, in order to be able to separate the mould release agent from the moulded product by spraying or washing with hot water. Furthermore, mould release agents which contain fluorochlorocarbons as main solvent or dispersing agent are known in the prior art. For instance, DE 37 31 223 describes release agent compositions with 1,1-dichloro-2,2,2-trifluoroethane (R123), DE 39 05 125 describes release agent compositions with 1,1-dichloro-1-fluoroethane, and DE 40 06 688 release agent compositions with dichloropentafluoropropanes (R225).

Despite these many diverse formulations in the prior art, there is still the problem of discovering beneficial alternatives for suitable release agent compositions.

It is the object of the invention to provide alternative liquid or pasty compositions of agents having release-effective properties, which permit economical use and which moreover can be used in moulds without having to clean the moulds often.

This object is achieved by the compositions, uses and methods according to the invention stated in the patent claims.

5 The present invention provides liquid or pasty compositions containing a solvent and at least one agent having release-effective properties, wherein difluoromethoxy-2,2,2-trifluoroethane (E245) is the main solvent and the release-effective agent is present in a quantity of 0.1 to 10% by weight, preferably 0.1
10 to 7% by weight, relative to the total composition (100% by weight). The quantity of E245 in the compositions according to the invention is generally at least 50% by weight, preferably 50 to 80% by weight.

15 In preferred compositions according to the invention, the main solvent E245 is present in a mixture with one or more additional solvents. The additional solvent (co-solvent) may be suitably selected from hydrogen-containing fluorochlorohydrocarbons (HFCHC), hydrogen-containing fluorohydrocarbons (HFHC), fluoro-
20 hydrocarbons (FHC), chlorohydrocarbons (CHC), non-halogenated aliphatic hydrocarbons, alcohols, ethers, ketones, etc. With these co-solvents, E245 may also be contained in the compositions according to the invention in the form of an azeotrope-like mixture or
25 as an azeotrope. The co-solvent component in a mixture with E245 serves in particular as a solubiliser for the release-effective agent contained in the compositions according to the invention. The co-solvent or solubiliser component is contained in these preferred
30 compositions in a quantity of 10 to 49.9% by weight, preferably from 13 to 49.9% by weight. The percentages in this case relate to the total composition.

Examples of useful co-solvents are, for instance, hydrogen-containing fluorochlorohydrocarbons such as in

particular 1,1-dichloro-1-fluoroethane (R141b),
1,1-dichloro-2,2,2-trifluoroethane (R123), tetrachloro-
monofluoroethane, trichlorodifluoroethane, monochloro-
hexafluoropropane, dichloropentafluoropropane or
5 mixtures thereof; or hydrogen-containing fluoro-
hydrocarbons or fluorohydrocarbons such as, in
particular, 1,1,1,2-tetrafluoroethane (R134a),
1,1,1-trifluoroethane (R143a), pentafluoroethane
(R125), difluoromethane (R32), 1,1,2-trifluoroethane
10 (R143), trifluoromethane (R23), 1,1-difluoroethane
(R152a), tetrafluoromethane (R14) and hexafluoroethane
(R116). Aliphatic non-halogenated hydrocarbons are in
particular conventional hydrocarbon fractions, e.g.
petroleum fractions.

15 Preferred solubilisers are aliphatic hydrocarbons,
preferably petroleum fractions having a boiling range
of e.g. 100 to 140°C.

The preferred compositions according to the invention
are furthermore characterised in that the release-
20 effective agent is selected from the group waxes,
silicones, metallic soaps, synthetic oils and inorganic
powders. Waxes are more preferred. The release-
effective agents may optionally also be used in
combination in the compositions according to the
25 invention.

In particular natural waxes of animal or vegetable
origin, preferably natural waxes having a softening
point of at least 40°C, are used as waxes in the
invention.

30 Additional waxes which may be used in the present
invention are synthetic waxes, preferably paraffin
waxes or polyethylene waxes. In one variant, for
instance an oxidised polyethylene wax having an average

molecular weight of 3,700 to 4,500 (viscosimetric) and an acid number of 20 to 30 and a melting point of 89 to 99°C is used.

5 Silicones are present as release-effective agents in another type of composition according to the invention. The silicones used may be in the form of oils, greases or resins, which are commercially available. Such silicones can be used as such or in the form of
10 silicone emulsions which optionally additionally contain a consistency regulator (e.g. highly-disperse silicic acid) incorporated into the silicone oil, or in the form of silicone pastes which usually contain metallic soaps as consistency regulators.

15 One variant of the invention is characterised in that the compositions contain metallic soaps, for instance fatty-acid salts of the metals magnesium, calcium, zinc, aluminium or lead, as release-effective agents. Optionally the metal salts of stearic acid are used, in which case magnesium stearate is then preferred.
20 A further variant of the compositions of the invention contains inorganic powders, preferably graphite, talcum or mica as release-effective agents. Furthermore, other conventional agents having release-effective properties, such as synthetic oils, e.g. ester oils,
25 may also be used in compositions according to the invention.

The compositions of this invention may optionally contain additives which are usual for release agents, for instance corrosion inhibitors, stabilisers and
30 consistency regulators.

For example, provision may be made to incorporate up to 1% by weight of known corrosion inhibitors to the compositions according to the invention. Such

corrosion inhibitors for metals such as magnesium, aluminium, titanium, brass, bronze and steel are commercially available. They are for the most part based on compositions which contain organic compounds with hetero atoms such as sulphur or, in particular, nitrogen. For instance, individual compounds or mixtures from the class of benzothiazoles, e.g. mercaptobenzothiazole, benzimidazoles, e.g. 2-phenylbenzimidazole, triazoles, e.g. benzotriazoles, tolyltriazoles, oxazolines, e.g. alkyl-substituted and/or hydroxyalkyl-substituted oxazolines, amides, amines, e.g. tert. amines, have proved suitable.

Furthermore, conventional stabilisers and consistency-regulating additives may optionally be added to the compositions according to the invention.

The compositions according to the invention are either in the form of dispersions or pastes, "dispersions" being understood to include both emulsions and suspensions.

The invention also comprises the use of the compositions according to the invention as release agents, lubricants or parting agents, for instance in the production of plastics materials or foam materials, or in other fields of use.

Furthermore, the invention provides a method for the preparation of the compositions according to the invention, in which one or more agents having release-effective properties in a quantity of 0.1 to 10% by weight, preferably 0.1 to 7% by weight, relative to the total mixture, are incorporated into the solvent E245 or into a solvent mixture comprising E245. Optionally, at the same time co-solvents (solubilisers), or other

additives such as stabilisers, corrosion inhibitors and consistency regulators may be added.

The compositions according to the invention with E245 as main solvent have improved adhesion-reducing properties, high chemical inertness and good spreading ability. Compared with conventional release agents in which hydrocarbons are used as solvents, the compositions according to the invention have a higher flash point. Furthermore, the use of the compositions according to the invention instead of conventional release agent compositions is more economical, since less release agent composition is consumed for the same application. Additional advantages are displayed over longer-term use of the moulds, for instance in that the moulds used need to be cleaned less frequently between operations.

The following examples are intended to explain the invention in greater detail, but without restricting its scope.

20 **Example 1:**

A composition according to the invention was produced from 6% by weight polyethylene wax (melting point 89 - 99°C) and 80% by weight difluoromethoxy-2,2,2-trifluoroethane (E245) and also 14% by weight hydrocarbon (petroleum fraction 100 - 140°C).

The composition was a dispersion and had excellent release-effective properties.

Examples 2 to 6:

Similarly to Example 1, the further Examples 2 to 6 of compositions according to the invention, set forth in the table below, were produced, which likewise had excellent release-effective properties. The constituents are given in % by weight.

	Constituents of the composition	Example				
		2	3	4	5	6
	E-245	99.9	80	76	50	50
10	Silicone oil (20,000 m ² /s)	0.1				
	Paraffin (melting point 56-58°C)					4
15	Polyethylene wax (melting point 89-99°C)				10	
	Polyethylene wax (melting point 98-108°C)		4	5		
	Magnesium stearate			1		
20	Petroleum fraction 100 - 140°C		16	18	40	46
		D*	D	D	P	D

D = dispersion

P = paste

* (The dispersion showed a slight, reversible settling behaviour; a perfectly satisfactory dispersion could be reformed at any time by shaking lightly.)



1. A liquid or pasty composition comprising at least on solvent and at least one agent having release-effective properties, wherein the composition contains
5 as main solvent difluoromethoxy-2,2,2-trifluoroethane (E245), and wherein the release-effective agent is present in an amount of 0.1 to 10% by weight of the total composition.
2. A composition according to Claim 1, wherein the
10 release-effective agent is selected from waxes, silicones, metallic soaps, synthetic oils and inorganic powders.
3. A composition according to Claim 2, wherein the waxes are natural waxes of animal or vegetable origin.
- 15 4. A composition according to Claim 3, wherein said natural waxes have a softening point of at least 40°C.
5. A composition according to Claim 2, wherein the waxes are synthetic waxes.
- 20 6. A composition according to Claim 5, wherein said synthetic waxes are paraffin waxes or polyethylene waxes.
7. A composition according to Claim 2, wherein the metallic soaps are fatty-acid salts of the metals magnesium, calcium, zinc, aluminium or lead.
- 25 8. A composition according to Claim 7, wherein said metallic soaps are stearates.
9. A composition according to Claim 2, wherein the inorganic powders are graphite, talcum or mica.



10. A composition according to any preceding claim,
wherein said release-effective agent is present in an
amount of 0.1 to 7% by weight of the total composition.
- 5 11. A composition according to any preceding claim,
wherein the composition also contains a cosolvent.
12. A composition according to Claim 12, wherein said
cosolvent is present in an amount of from 10 to 49.9%
by weight of the total composition.
- 10 13. A composition according to Claim 12, wherein said
cosolvent is present in an amount of from 13 to 49.9%
by weight of the total composition.
14. A composition according to any one of Claims
11-13, wherein said cosolvent is an aliphatic
hydrocarbon.
- 15 15. A composition according to Claim 14, wherein said
cosolvent is a petroleum fraction having a boiling
range of 100 to 140°C.
16. The use of a composition according to any
preceding claim as a release agent, lubricant and/or
20 parting agent.
17. A method for the preparation of a composition
according to Claim 1, wherein at least one agent having
release-effective properties in a quantity of 0.1 to
10% by weight, relative to the total mixture, is
25 incorporated into the solvent difluoromethoxy-2,2,2-
trifluoroethane.
18. A method according to Claim 17, wherein there is a
composition as defined in any one of Claims 2-15.