COEI-1-MEMELE Electrodialysis membranes

1. Objective, Origin and Scope of Application

An electrodialysis membrane is a thin, dense, insoluble wall composed of a polymer material that is permeable to ions. When placed between two solutions, it allows the selective transfer of ions from one solution to the other when acted upon by an electric field.

The membrane pair consists of a cationic membrane and an anionic membrane.

The cationic membrane is a polymer which allows the preferred flow of cations, in particular the K^+ and Ca^{++} cations.

The anionic membrane is a polymer which allows the preferred flow of anions, in particular tartrate anions.

Electrodialysis membranes are used to stabilize wine in the event of tartaric precipitation.

2. Composition

The cation-exchange membrane that can be used is a styrene-divinylbenzene copolymer which carries sulfonic functional groups.

The anion-exchange membrane that can be used is either:

A styrene-divinylbenzene copolymer which carries quaternary ammonium functional groups, or A quaternary ammonium-divinylbenzene copolymer.

Electrodialysis membranes used for tartaric stabilization in wine should meet the following requirements:

2.1. They should be manufactured in accordance with the good manufacturing practices for the substances enumerated in :

2.1.1. Annex 1 pertaining to materials placed in contact with foodstuffs

2.1.2. Annex 2 and Annex 3 pertaining to ion-exchange resins used in processing foodstuffs

2.2. They should be prepared to serve their intended function, in accordance with the instructions of the manufacturer or supplier.

2.3. They should not release any substance in a quantity which poses a human health threat or which alters the taste or odor of foodstuffs.

2.4. In use, there should be no interaction between the constituents of the membrane and those of the wine that could form new compounds in the product that could produce toxicological consequences.

The stability of new electrodialysis membranes shall be established using a simulator which reproduces the physicochemical properties of wine, in order to study the migration of certain substances given off by the electrodialysis membrane.

The proposed experimental method is as follows:

Composition of the simulator:

This is an hydro-alcoholic solution with the pH and conductivity of wine. It is composed of

the following:

Absolute ethanol	11 liters
Potassium hydrogen tartrate	380 g
Potassium chloride	60 g
Concentrated sulfuric acid	5 ml
Distilled water	quantity sufficient for 100 liters

This solution is used to test migration in a closed circuit on a live electrodialysis stack (1 volt/cell) in a proportion of 50 liters/m^2 of anionic and cationic membranes until the solution is 50% demineralized. The effluent circuit is activated by a 5 g/l potassium chloride solution.

The migrating substances tested for in the simulator and in the electrodialysis effluent.

The organic molecules forming a constituent of membrane and which can migrate into the treated solution will be quantitatively analyzed.

A specific determination for each of these constituents will be carried out an approved laboratory. The content in the simulator must be less than the total, for all compunds analyzed at 50 µg/l.

Generally, the rules governing materials used in contact with foodstuffs shall also apply to these membranes.

3. Limits on use

The membrane pair used for tartaric wine-stabilizationprocessing using electrodialysis is specified in such a way that:

- the pH reduction in the wine is no greater than 0.3 pH units;

- volatile acid reduction is less than 0.12 g/l (2 meq. expressed in acetic acid);
- electrodialysis-based processing does not affect the non-ionic constituents of the wine, in particular the polyphenols and polysaccharides;
- the diffusion of small molecules such as ethanol is reduced and does not lead to a reduction of alcohometric content greater than 0.1%.

4. Conditions of use

These membranes should be stored and cleaned using accepted techniques and substances whose use is authorized for the preparation of foodstuffs.

Annex 1

List of monomers and other starting substances that can be used in the manufacture of plastic materials and devices designed to be placed in contact with foodstuffs, products, and beverages.

List of approved monomers and other starting substances			
PM/REF No.	Case No.	Name	Restrictions
(1)	(2)	(3)	(4)
10030	000514-10-3	Abietic acid	
10060	000075-07-0	Acetaldehyde	
10090	000064-19-7	Acetic acid	
10120	000108-05-4	Vinyl acetate	SML = 12 mg/kg
10150	000108-24-7	Acetic anhydride	
10210	000074-86-2	Acetylene	
10630	000079-06-1	Acrylamide	SML = ND (DL = 0.01 mg/kg
10660	015214-89-8	2-acrylamido-2-methylpropane-sulfonic acid	SML = 0/05 mg/kg

10690	000079-10-7	Acrylic acid	
10750	002495-35-4	Benzyl acrylate	
10780	000141-32-2	n-butyl acrylate	
10810	002998-08-5	Sec-butyl acrylate	
10840	001663-39-4	Tert-butyl acrylate	
11470	000140-88-5	Ethyl acrylate	
	000818-61-1	Hydroxyethyl acryltae	See « Ethylene glycol monoacrylate »
11590	00106-63-8	Isobutyl acrylate	
11680	00689-12-3	Isopropyl acrylate	
11710	000096-33-3	Methyl acrylate	
11830	000818-61-1	Ethylene glycol monoacrylate	
11890	002499-59-4	n-octyl acrylate	
11980	000925-60-0	Propyl acrylate	

PM/REF N°	Case N°	Name	Restrictions
12100	000107-13-1	Acrylonitrile	LMS = ND (LD = 0,020 mg/kg) (including analylic tolerance)
12310		Albumin	
12340		Albumin coagulated by formaldehyde	
12375		Saturate, linear, primary monhydric alcohols (C_4-C_{22})	
12670	002855-13-2	1-amino-3-aminomethyl-3,5,5-trimethylcyclohexane	SML = 6 mg/kg
12788	002432-99-7	11-aminoundecanoic acid	SML = 5 mg/kg

12789	007664-41-7	Ammonia	
12820	00123-99-9	Azelaic acid	
12970	004196-95-6	Azelaic anhydride	
13000	001477-55-0	1,3-benzene dimethanamine	SML = 0.05 mg/kg
13090	000065-85-0	Benzoic acid	
13150	000100-51-6	Benzylic acid	
	000111-46-6	Bis(2-hydroxyehtyl)ether	See Diethylene glycol
	000077-99-6	2,2-bis(hydroxymethyl)-1-butanol	See 1,1,1-trimethylolpropane
13390	000105-08-8	1,4-bis(hydroxymethyl) cyclohexane)	
13480	000080-05-7	2,2-bis(4-hydroxyphenyl) propane	SML = 3 mg/kg
13510	001675-54-3	Bis(2,3-epoxypropylic) ether of 2,2-bis(hydroxyphenyl) propane	MQ = 1 mg/kg PF or SML = non-detectable (DL = 0.020 mg/kg, including analytic tolerance)
	000110-98-5	Bis(hydroxypropylic) ether	See Dipropylene glycol
	005124-30-1	Bis(4-isocyananato-cyclohexyl) methane	See 4,4-Diisocyanate dedicyclohexylmethane
13530	038103-06-9	Bis(phthalic anhydride) of 2,2 bis(4-hydroxyphenyl) propane	SML = 0.05 mg/kg
13600	047465-97-4	3,3-bis(3-methyl-4-hydroxyphenyl)-2-indolinone	SML = 1.8 mg/kg
	000080-05-7	Bisphenol A	See 2,2-bis(4-hydroxyphenyl) propane
	001675-54-3	Bis(2,3-expoypropylic)ether of bisphenol A	See Bis(2,3-epoxypropylic)ether of 2,2-bis(4-hydroxyphenyl) propane
13614	038103-06-9	Bis (phthalic anyhydride)of bisphenol	See 13530

PM/REF N°	Case N°	Name	Restrictions

13630	000106-99-0	Butadiene	MQ = 1 mg/kg of PF or SML = non-detectable (DL = 0.02 mg/kg, including analytic tolerance)
3690	000107-88-0	1,3-butanediol	
13840	000071-36-3	1-butanol	
13870	000106-98-9	1-butene	
13900	000107-01-7	2-butene	
14110	000123-72-8	Butyraldehyde	
14140	000107-92-6	Butyric acid	
14170	000106-31-0	Butyric anhydride	
14200	000105-60-2	Caprolactam	SML(T) = 15 mg/kg
14230	002123-24-2	Caprolactam, sodium salt	SML(T) = 15 mg/kg (expressed in terms of caprolactam)
14320	0001207-2	Caprylic acid	
14350	00630-08-0	Carbon monoxide	
14380	000075-44-5	Carbonyl chloride	MQ = 1 mg/kg in FP
14411	008001-79-4	Castor oil	
14500	009004-34-6	Cellulose	
14530	007782-50-5	Chlorine	
	000106-89-8	1-chloro-2,3-epoxy propane	See Epichlorhydrin

14680	000077-92-9	Citric acid	
14710	000108-39-4	*m*-cresol	
14740	000095-48-7	*o*-cresol	
14770	00106-44-5	*p*-cresol	
	00105-08-8	1,4-cyclohexanedi-methanol	See 1,4-bis(hydroxymethyl) cyclohexane
14950	003173-53-3	Cyclohexyl isocyanate	MQ(T) = 1 mg/kg in FP (expressed as NCO)
15070	001647-16-1	1,9-decadiene	SML = 0.05 mg/kg
15095	000334-48-5	Decanoic acid	
15100	000112-30-1	1-decanol	

PM/REF N°	Case N°	Name	Restrictions
	000107-15-3	1,2-diaminoethane	See Ethylenediamine
	000124-09-4	1,6-diaminohexane	See Hexamethylene-diamine
15250	000110-61-1	1,4-diaminobutane	
15565	0000106-46-7	1,4-dichlorobenzene	SML == 12 mg/kg
15700	005124-30-1	Icyclohexylmethane-4,4'- diisocyanate	MQ(T) – 1 mg/kg in FP (expressed as NCO)

15760	000111-46-6	Diethylene glycol	SML(T) = 30 mg/kl alone or with ethylene glycol
15790	000111-46-6	Diethylene triamine	SML = 5 mg/kg
15820	000345-92-6	4,4'-difluorobenzo-phenone	SML = 0.05 mg/kg
15880	000120-80-9	1,2-dihydroxybenzene	SML = 6 mg/kg
15910	000108-46-3	1,3-dihydroxybenzene	SML = 2.4 mg/kg
15940	000123-31-9	1,4-dihydroxybenzene	SML = 0.6 mg/kg
15970	000611-99-4	4,4'-dihydroxybenzo-phenone	SML = 6 mg/kg
16000	000092-88-6	4,4'-dihydroxydiphenyl	SML = 6 mg/kg
16150	000108-01-0	Dimethylaminoethanol	SML = 18 mg/kg
16240	000091-97-4	3,3'-dimethylbiphenyl-4,4'-diisocyanate	MQ(T) = 1 mg/kg in FP (expressed as NCO)
16480	000126-58-9	Dipentaerythritol	
16570	004128-73-8	4,4'-diisocyanate of diphenyl ether	MQ(T) = 1 mg/kg in FP (expressed as NCO)
16600	005873-54-1	Diphenylmethane-2,4'-diisocyanate	MQ(T) = 1 mg/kg in FP (expressed as NCO)
16630	000101-68-8	Diphenylmethane-4,4'-diisocyante	MQ(T) = 1 mg/kg in FP (expressed as NCO)
16660	000110-98-5	Diproylene glycol	

16750	000106-89-8	Epichlorhydrin	MQ = 1 mg/kg in FP
16780	000064-17-5	Ethanol	
16950	000074-85-1	Ethylene	
16960	000107-15-3	Ethylenediamine	SML = 12 mg/kg
16990	000107-21-1	Ethylenje glycol	SML(T) = 30 mg/kg alone or with diethylene glycol

PM/REF N°	Case N°	Name	Restrictions
17005	000151-56-4	Ethyleneimine	SML = ND (DL = 01 mg/kg)
17020	000075-21-8	Ethylene oxide	MQ = 1 mg/kg in FP
17050	000104-76-7	2-ethyl-1-hexanol	SML = 30 mg/kg
17160	000097-53-0	Eugenol	SML= 0.1 mg/kg
17170	061788-47-4	Coconut fatty acids	
17200	068308-53-2	Fatty acids of soybean oil	
17230	061790-12-3	Fatty acids of tall oil	
17260	000050-00-0	Formaldehyde	SML = 15 mg/kg
17290	000110-17-8	Fumaric acid	
17530	000050-99-7	Glucose	
18010	000110-94-1	Glutaric acid	
18070	000108-55-4	Glutaric anhydride	
18100	000056-81-5	Glycerol	
18250	000115-28-6	Hexachloroendo-methyl-Enetetrahy-drophthalic acid	SML = ND (DL = 0.01 mg/kg)

18280	00115-27-5	Hexachloroendome-thyl Enetetrahydro-phthalic anhydride	SML = ND (DL = 0.01 mg/kg)
18310	036653-82-4	1-hexadecanol	
18430	00116-15-4	Hexafluoropropylene	SML = ND (DL = 0.01 mg/kg)
18460	000124-09-4	Hexamethylenediamine	SML = 2.4 mg/kg
18640	000822-06-0	Hexamethylene diisocyanate	MQ(T) = 1 mg/kg in FP (expressed as NCO)
18670	000100-97-0	Hexamehtylene tetramine	SML(T) = 15 mg/kg (expressed as formaldehyde)
	00123-31-9	Hydroquinone	See 1,4-dihydroxybenzene
18880	000099-96-7	p-hydroxybenzoic acid	
19000	000115-11-7	Isobutene	
19210	001459-93-4	Dimethyl isophthalate	SML = 0.05 mg/kg
19270	000097-65-4	Itaconic acid	
19460	000050-21-5	Lactic acid	

PM/REF N°	Case N°	Name	Restrictions
19470	000143-07-7	Lauric acid	
19480	002146-71-6	Vinyl laurate	
19510	011132-73-3	Lignocellulose	
19540	000110-16-7	Maleic acid	SML(T) 30 mg/kg
19960	00108-31-6	Maleic anhydride	SML(T) = 30 mg/kg (expressed as maleic acid)

	000108-31-6	Melamine	See 2,4,6-triamino-1,3,5-triazine
20020	000079-41-4	Methacrylic acid	
20080	002495-37-6	Benzyl methacrylate	
20110	000097-88-1	Butyl methacrylate	
20140	002998-18-7	sec-butyl methacrylate	
20890	000097-63-2	Ethyl methacrylate	
21010	000097-86-9	Isobutyl methacrylate	
21100	004655-34-9	Isopropyl methacrylate	
21130	000080-62-6	Methyl methacrylate	
21190	000868-77-9	Ethylene glycol monomethacrylate	
21280	002177-70-0	Phenyl methacrylate	
21340	000760-93-0	Propyl methacrylate	
21460	000760-93-0	Methacrylic anhydride	
21490	000126-98-7	Methacrylonitrile	SML = not detectable (DL = 0.020 mg/kg, including analytic tolerance)
21550	000067-56-1	Methanol	
21940	000924-42-5	N-methylolacrylamide	SML = ND (DL = 0.0 mg/kg)
22150	000691-37-2	4-methyl-pentene	SML = 0.02 mg/kg
22350	000544-63-8	Myristic acid	

22390	000840-65-3	2,6-dimethyl naphthalene-dicarboxylate	SML = 0.05 mg/kg
22420	003173-72-6	1,5-naphthalene diisocyanate	MQ(T) 1 mg/kg in FP (expressed as NCO)

PM/REF N°	Case N°	Name	Restrictions
22450	009004-70-0	Nitrocellulose	
22480	000143-08-8	1-nonanol	
22570	000112-96-9	Octadecyl isocyanate	MQ(T) = 1 mg/kg in FP (expressed as NCO)
22600	000111-87-5	1-octanol	
22660	000111-66-0	1-octene	SML = 15 mg/kg
22763	000112-80-1	Oleic acid	
22780	000057-10-3	Palmitic acid	
22840	000115-77-5	Pentaerythritol	
22870	000071-41-0	1-pentanol	
22960	000108-95-2	Phenol	
23050	000108-45-2	1,3-phenylenediamine	MQ = 1 mg/kg in FP
	000075-44-5	Phosgene	See Carbonyl chloride
23170	007664-38-2	Phosphoric acid	
		Phthalic acid	See Terephthalic acid
23200	000088-99-3	*o*-phthalic acid	

23230	000131-17-9	Diallyl phthalate	SML = ND (DL = 0.01 mg/kg)
23380	000085-44-9	Phthalic anhydride	
23470	000080-56-8	alpha-pinene	
23500	000127-91-3	beta-pinene	
23590	025322-68-3	Polyethylene glycol	
23651	025322-69-4	Polypropylene glycol	
23740	000057-55-6	1,2-propanediol	
23800	000071-23-8	1-propanol	
23830	000067-63-0	2-propanol	
23860	000123-38-6	Propionaldehyde	
23890	000079-09-4	Propionic acid	
PM/REF N°	Case N°	Name	Restrictions
23950	000123-62-6	Propionic anhydride	
23980	000115-07-1	Propylene	
24010	000075-56-9	Propylene oxide	MQ = 1 mg/kg in FP
	000120-80-9	Pyrocatechol	See 1,2-dihydroxybenzene
24057	000089-32-7	Pyromellitic anhydride	SML = 0.05 mg/kg (expressed as pyromellitic acid)
24070	073138-82-6	Resin acids	

	000108-46-3	Resorcinol	See 1,2-dihydroxybenzene
24100	008050-09-7	Rosin	
24130	008050-09-7	Rosin gum	See Rosin
24160	008052-10-6	Tall oil resin	
24190	009014-63-5	Wood resin	
24250	009006-04-6	Natural rubber	
24270	000069-72-7	Salicylic acid	
24280	000111-20-6	Sebacic acid	
24430	002561-88-8	Sebacic anhydride	
24475	001313-82-2	Sodium sulfide	
24490	000050-70-4	Sorbitol	
24520	008001-22-7	Soybean oil	
24540	009005-25-8	Food starch	
24550	000057-11-4	Stearic acid	
24610	000100-42-5	Styrene	
24820	000110-15-6	Succinic acid	
24850	000108-30-5	Succinic anhydride	
24880	000057-50-1	Saccharose	
24887	006362-79-4	5-sulfoisophthalic acid, monosodium salt	SML = 5 mg/kg

PM/REF N°	Case N°	Name	Restrictions
24888	003965-55-7	5-dimethylsulfo- isophthalate, monosodium salt	SML = 0.05 mg/kg
24910	000100-21-0	Terephthalic acid	SML = 7.5 mg/kg
24940	000100-20-9	Terephthalic acid dichloride	SML(T) = 7.5 mg/kg (expressed as terephathalic acid)
24970	000120-61-6	Dimethyl terephthalatae	
25090	000112-60-7	Tetraethylene glycol	
25120	000116-14-3	Tetrafluoroethylene	SML = 0.05 mg/kg
25150	000109-99-9	Tetrahydrofuran	SML = 0.6 mg/kg
25180	000102-60-3	N,N,N',N'-tetrakis(2-hydroxypropyl)-ethylene-diamine	
25210	000584-84-9	Toluene-2,4-diisocyanate	MQ(T) = 1 mg/kg in FP (expressed as nCO)
25240	000091-08-7	Toluene-2,6-diisocyanate	MQ(T) = 1 mg/kg in FP (expressed as nCO)
25270	026747-90-0	Toluene-2,4-diisocyanate, dimer	MQ(T) = 1 mg/kg in FP (expressed as nCO)
25360		2,3-epoxy trialkyl(C_5-C_{15}) acetate	SML = 6 mg/kg
25420	000108-78-1	2,4,6-triamino-1,3,5-triazine	SML = 30 mg/kg
25510	000112-27-6	Triethylene glycol	
25600	000077-99-6	1,1,1-trimethylolpropane	SML = 6 mg/kg
25910	024800-44-0	Tripropylene glycol	
25960	000057-13-6	Urea	
26050	000075-01-4	Vinyl chloride	See Council Directive 78/142/EEC

26110	000075-35-4	Vinylidene chloride	MQ = 5 mg/kg in FP or SML = ND (DL = 0.05 mg/kg)
26140	000075-38-7	Vinylidene fluoride	SML = 5 mg/kg

A number of abbreviations or notations are given in Column 4. Their meaning is listed below:

- DL =Detection limit of the analytical method.
- FP = Finished material or product
- NCO = isocyanate group
- ND = not detectable.

For the purposes of the present directive, the expression «not detectable» means that the substance will not be detected by the approved analytical method, which is sensitive enough to detect it at the specified detection limit. If, however, a method of this kind does not currently exist, an analytical technique possessing performance characteristics suited to the specified limit may be used, while awaiting the development of an approved method.

- MQ = maximum permitted quantity of the «residual» substance in the material or article.
- MQ(T) = maximum permitted quantity of residual substance in the material or article, expressed as the total group or of the indicated substances(s).

For the purposes of this directive, «MQ(T)» means that the maximum permitted quantity of the «residual» substance in the material or article should be determined using an analytical method approved for the specified limit. If, however, a method of this kind does not currently exist, an analytical technique possessing performance characteristics suitable for determining the specified limit may be used, while awaiting the development of an approved method.

- SML = specific migration limit in the food product or the simulated food, unless otherwise specified.

For the purposes of this directive, «SML» means that the specific migration of the substance should be determined using an analytical method approved for the specified limit. If, however, a method of this kind does not currently exist, an analytical technique possessing performance characteristics suitable for determining the specified limit may be used, while awaiting the development of an approved

method.

- SML(T) = specific migration limit in the food product or simulated food, expressed as the total

of the group or of the indicated substance(s).

For the purposes of this directive, «SML(T)» means that the specific migration of the substance should be determined using an analytical method approved for the specified limit. If, however, a method of this kind does not currently exist, an analytical technique possessing performance characteristics suitable for determining the specified limit may be used, while awaiting the development of an approved method.

Annex 2: List of substances used in the manufacture of adsorbant ion-exchange resins used to condition foodstuffs. (Resolution AP (97)1 EC)

List 1: Substances assessed by an international organization			
Name	PM/REF	Case	Restrictions
Monomers and other Starting substances			
n-butyl acrylate	10780	00141-32-2	-
Ethyl acrylate	11470	00140-88-5	-
Methyl acrylate	11710	00096-33-3	-
Acrylonitrile	12100	00107-13-1	SML = ND
			(DL = 0.02 mg/kg)
			SML = 15 mg/kg
Formaldehyde	17260	00050-00-0	
Methyl methacrylate	21130	00080-62-6	-
Methanol	21550	00067-56-1	-

Styrene	24610	00100-42-5	-
Chemical Modifiers			
Carbonic acid, salts	42500	-	-
Hydrochloric acid	72640	07664-38-2	-
Silicic acid, salts	85980	-	-
Sulfuric acid	91920	07664-93-9	-
Acetic anhydride	10150	00108-24-7	-
tert-butyl-4-hydroxyanisole (BHA)	40720	25013-16-5	SML=30 mg/kg
Diethylene triamine	15790	00111-40-0	SML= 5 mg/kg
Dimethylamine	49225	00124-40-3	SML=0.06 mg/kg
2-(dimethylamino)ethanol	49235	00108-01-0	SML=18 mg/kg
Formaldehyde	54880	00050-00-0	SML=15 mg/kg
Hexamethylenediamine	18460	00124-09-4	SML=2.4 mg/kg
Potassium hydroxide	81600	01310-58-3	-
Sodium hydroxide	86720	01310-73-2	-
Sodium nitrite	86920	07632-00-0	SML=0.6 mg/kg
Ethylene oxide	17020	00075-21-8	MQ=1 mg/kg in FP
2-propanol	81882	00067-63-0	-
Polymerization Additives			

Akylsulfonic acids (C_8-C_{22})	34230	-	SML=6 mg/kg
Linear, primary alkylsulfuric	34281	-	-
acids (C_8-C_{22}) having an even number of carbon atoms			
Formic acid	55040	00064-18-6	-
Carboxymethylcellulose	42640	09000-11-7	-
Stannic chloride(IV)	93420	07646-78-8	-
Methylene chloride	66620	00075-09-2	SML=0.05 mg/kg
1,4-dihydroxybenzene	48620	00123-31-9	SML=0.6 mg/kg
Gelatin	55440	09000-70-8	-
Ammonium hydroxide	35600	01336-21-6	-
Magnesium hydroxide	64640	01309-42-8	-
Hydroxyethylcellulose	60560	09004-62-0	-
Hydroxethylmethylcellulose	60880	09032-42-4	-
Methanol	65960	00067-56-1	-
Methylcarboxymethylcellulose	66200	37206-01-2	-
Methyl isobutyl ketone	66725	00108-10-1	SML=5 mg/kg
Toluene	93540	00108-88-3	SML=1.2 mg/kg

Annex 3 Substances that may be used provisionally to manufacture ion-exchange resins.

List 2 Substances not fully evaluated by an international organization

Name	PM/REF	Case	Restrictions
Monomers and other starting substances			
Ethylene glycol dimethacrylate	20440	00097-90-5	-
Divinylbenzene	16690	01321-74-0	-
Diallyl ether of 1,1,1-tri-methylolpropane	25645	00682-09-7	-
2,3-epoxypropyl methacrylate	20590	00106-91-2	-
2-methyl-1,3-butadiene	21640	00078-79-5	-
1,7-octadiene	22585	03710-30-3	-
1,1,1-trimethylolpropane trimethacrylate	25840	03290-92-4	-
Chemical Modifiers			
N,N-dimethyl-1,3-diamino-propane	49380	00109-55-7	-
Triethylamine	95270	00121-44-8	-
Triethylene tetramine	25520	00112-24-3	-
Polymerization Additives			
Polyvinyl alcohols	81280	09002-89-5	-
4-tert-butylcatechol	40640	00098-29-3	-
Diisobutyl ketone	49050	00108-83-8	-
Sodium hypochlorite	62110	07681-52-9	-

Isobutanol	62270	00078-83-1	-
4-methoxyphenol	66030	00150-76-5	-
Methylene bis(sodium naphtha- lenesulfonate)	66600	26545-58-4	-
2-methyl-2-pentanol	66860	00108-11-2	-
Dibenzoylperoxide	46440	00094-36-0	-
Partially hydrolyzed vinyl polyacetate	81260	-	-
Substances not evaluated by an international organization			
Name	PM/REF	Case	Restrictions
Monomers and other starting substances			
Dimethoxymethane	-	00109-87-5	-
Diethylene glycol divinyl ether	-	00764-99-8	-
Ethyl vinyl benzene	-	28106-30-1	-
1,2,4-trivinyl cyclohexane	-	02855-27-8	-
Chemical Modifiers			
Chlorosulfonic acid	-	07790-94-5	-
Monochloroacetic acid	-	00079-11-8	-
Phosphoric acid	-	13598-36-2	-
Bromine	-	07726-95-6	-
2-chloroethanol	-	00107-07-3	-

Methyl chloride	-	00074-87-3	-
1,2-dichloroethane	-	00107-07-3	-
1,2-dichloropropane	-	00078-87-5	-
3-(dimethylamino)propane	-	03179-63-3	-

Name	PM/REF	Case	Restrictions
Monomers and other starting substances			
Methylic chloromethyl ether	-	00107-30-2	-
Nitrobenzene	-	00098-95-3	-
Potassium nitrite	-	07758-09-0	-
Phthalimide	-	0085-41-6	-
Sulfur trioxide	-	07446-11-9	-
Trimethylamine	-	00075-50-3	-
Polymerization additives			
Lignosulfonic acid	63940	08062-15-5	-
Peracetic acid	-	00079-21-0	-
Polyacrylic acid	76460	09003-01-4	-
Poly(styrenesulfonic) acid	-	09080-79-9	-
Acrylamide/acrylic acid copolymer	-	09003-06-9	-
Ethoxylated, propoxylated tert-alkylamines (C_{12}-C_{14})	-	68603-58-7	-

Maleic anhydride-styrene copolymer, ammonium salt	-	26022-09-3	-
Attapulgite	-	12174-11-7	-
Azobisisobutyronitrile	-	00078-67-1	-
1,1-bis(tert-butylperoxy)-3,3,5-trimethylcyclohexane	-	06731-36-8	-
n-Dodecyl mercaptan	-	25103-58-6	-
Poly(ethylene/propylene)glycol monobutyl ester	-	09038-95-3	-
Polyethylene glycol octylphenyl ether	78560	09002-93-1	
Poly(ethylene-propylene/glycol ether with 1,1,1-tromethylol-propane	-	52624-57-4	-
tert-hexadecyl mercaptan	-	25360-09-2	-
Cumyl hydroperoxide	-	00080-15-9	-
Isododecane	62405	31807-55-3	-
Isooctane	-	26635-64-3	-
Mono- and dialkyl (C_{10}-C_{18}) Sulfonamides	-	-	-
Silver nitrate	-	07761-88-8	-
n-Octane	-	00111-65-9	-
tert-Butyl peracetate	-	00107-71-1	-
tert-Butyl perbenzoate	-	00614-45-9	-

bis(4-tert-butylcyclohexyte) percarbonate tert-	-	15520-11-3	-
Butyl per(2-ethyl-hexanoate)	-	03006-82-6	-
tert-Butyl peroctanoate	-	13467-82-8	-
Dilauroyl peroxide	-	00105-74-8	-
Poly(diallyldimethylammonium chloride	-	26062-79-3	-
Polyvinylpyrrolidone	81500	09003-39-8	-