

## **Empfehlungen zur Sperrung von Küsten nach der Anschwemmung von flüssigen Ladungsresten**

Aktualisierte Information Nr. 004/2011 des BfR vom 21. Januar 2011\*

Angespülte Öle oder chemische Produkte können Küsten und Strände nicht nur verschmutzen, sondern auch zu einem Gesundheitsrisiko werden. Ursachen der teerigen Klumpen oder Anschwemmungen schlickiger Flecken sind häufig illegal abgelassene Maschinenöle, illegal eingeleitete Ladungsrückstände aus Öltankern oder ausgespülte Ladungsrückstände aus anderen Tankschiffen. Besonders große Mengen können nach Havarien in das Meer gelangen. Manche Substanzen können krebserzeugend, hautätzend und gefährlich für Schwangere sein, wenn sie nicht sofort abgewaschen werden. Die Vereinten Nationen haben aufgrund dieser Risiken Empfehlungen zur Sperrung von Küstenabschnitten bei der Anschwemmung flüssiger Ladungsreste nach Schiffsunfällen oder illegalen Einleitungen erarbeitet. Damit steht für die Länder ein Instrument bereit, kurzfristig angemessene Maßnahmen zum Schutz der Bevölkerung einzuleiten.

Die Empfehlungen wurden von der Expertengruppe der Vereinten Nationen zu wissenschaftlichen Aspekten des marinen Umweltschutzes (GESAMP), in der unter anderem Vertreter der Internationalen Seeschiffahrtsorganisation (IMO), des Umweltprogramms der Vereinten Nationen (UNEP), der für Fischerei zuständigen Ernährungs- und Landwirtschaftsorganisation der Vereinten Nationen (FAO) und auch des Bundesinstituts für Risikobewertung (BfR) mitarbeiten, erstellt.

Dazu wurden die gesundheitsgefährliche Wirkungen von rund 800 Chemikalien auf Grundlage wissenschaftlicher Literatur und Untersuchungen der Hersteller bewertet. Es wurde auf die bei der Internationalen Seeschiffahrtsorganisation vorliegenden oft vertraulichen Meldedokumente der in Chemikaliertankern beförderten flüssigen Stoffe zurückgegriffen. Neben dem Vergiftungspotenzial und der akuten Toxizität wurden die langfristigen gesundheitsschädlichen Risiken der Stoffe, einschließlich der krebserzeugenden, mutagenen und die Fortpflanzung beeinträchtigenden Eigenschaften (chronische Toxizität) berücksichtigt. Die aktuelle Liste umfasst die wichtigsten flüssigen Massengüter, die in Chemikaliertankschiffen bzw. NLS-Tankern befördert werden, und unterteilt das von den Stoffen ausgehende Gesundheitsrisiko in vier Stufen, die abgestufte Maßnahmen ermöglichen sollen:

Stufe 0 – keine Gesundheitsgefahr

Stufe 1 – Warnung der Bevölkerung

Stufe 2 – Teilspernung der Küstenabschnitte mit eingeschränkter Nutzung

Stufe 3 – weiträumige Sperrung des betroffenen Küstenabschnittes

Das BfR stellt im Folgenden die Liste mit den Namen der Stoffe und den Empfehlungen von GESAMP zur Verfügung.

### **Empfehlungen**

Die Einstufungen beruhen auf Bewertungen der Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships der IMO/ FAO/ UNESCO-IOC/ WMO/ WHO IAEA/ UN/ UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP). Sie sind als Leitlinien für Sicherungsmaßnahmen an Küsten

\* Die aktualisierte Fassung der Stellungnahme ersetzt die Stellungnahme Nr. 013/2007 vom 15. Januar 2007

nutzbar, wenn Reste flüssiger Ladungen angeschwemmt werden, bis fachkompetente Einschätzungen und Messungen durch Experten vor Ort vorliegen. Eine starke Verdünnung der Stoffe im Wasser kann die Gefährlichkeit der Stoffe verringern und zu einer geringeren Einstufung führen.

Für einige flüssige Massengüter ist aufgrund mangelhafter Information keine Angabe („k.A.“) einer Einstufung möglich. Auch eine Offenlegung der Datenlücken für eine gesundheitliche Bewertung gegenüber den Herstellern führte nicht zu einer Bereitstellung toxikologischer Information, die hierzu ausgereicht hätte.

### **Stufe 0 – Keine Gefahr**

Es ist keine Warnung zu veröffentlichen, da kein Risiko für Gesundheitsschäden besteht, keine leichte Entzündung befürchtet werden muss, und es zu keiner Filmbildung auf der Wasseroberfläche kommen kann.

### **Stufe 1 – Warnung**

Es wird empfohlen, eine Warnung zu veröffentlichen, die Nutzer betroffener Küstenbereiche oder Strandabschnitte auf mögliche Risiken aufmerksam macht. Ein direkter Kontakt mit diesen Stoffen kann zu leichter Reizung von Haut und Augen führen. Insbesondere bei Kindern kann es zu Vergiftungen kommen, wenn solche Stoffe verschluckt werden. Einige der genannten Stoffe schwimmen als Film auf der Wasseroberfläche, ohne für Menschen besonders gefährlich zu sein.

### **Stufe 2 – Teilspernung**

Es wird empfohlen, eine Warnung zur eingeschränkten Nutzung betroffener Küstenbereiche oder Strandabschnitte auszusprechen. Personen ohne entsprechende Ausbildung oder Schutzkleidung dürfen die verunreinigten Bereiche nur in Ausnahmefällen betreten. Ein direkter Kontakt kann zu starker Reizung von Haut und Augen, aber auch zu Vergiftungen führen. Einige der aufgeführten Stoffe sind äußerst gefährlich für Schwimmer, können selbst im Wasser verdünnt beim Verschlucken Lungenschäden oder Vergiftungen hervorrufen. Einige der genannten Stoffe können sich unter Hitzeeinwirkung explosionsartig entzünden.

### **Stufe 3 – Sperrung**

Es wird die Sperrung betroffener Küstenbereiche oder Strandabschnitte empfohlen. Nur Personen mit entsprechender Schutzkleidung dürfen die verunreinigten Bereiche betreten. Für ungeschützte Personen besteht die Gefahr schwerer gesundheitlicher Schäden, vor allem, wenn sie Dämpfe einatmen oder Hautkontakt entsteht. Es besteht das Risiko der schnellen Zerstörung der Haut, tödlicher Vergiftungen oder langfristiger Gesundheitsschäden. Insbesondere Schwangere und Kinder sind deutlich gefährdet. Einige der hier aufgeführten Stoffe bilden einen Film auf der Wasseroberfläche und erzeugen beim Verschlucken schwere Lungenschäden, die für Kinder lebensgefährlich sind.

## 2 Stoffliste

Internationaler Name des beförderten Stoffes	Stufe
<b>A</b>	
Acetic acid	3
Acetic anhydride	3
Acetochlor	2
Acetone	2
Acetone cyanohydrin	3
Acetonitrile	2
Acetonitrile (Low purity grade)	2
Acid oil mixture from soyabean, corn (maize) and sunflower oil refining	2
Acrylamide solution (50% or less)	3
Acrylic acid	3
Acrylic acid/dimethyldiallylammonium chloride copolymer, partial sodium salt (MW 1500-4000, in aqueous solution)	1
Acrylic acid / ethenesulfonic acid copolymer containing carboxylate, phosphonate and sulfonate groups, sodium salt	1
Acrylonitrile	3
Acrylonitrile-Styrene copolymer dispersion in polyether polyol	0
Adiponitrile	3
Alachlor technical (90% or more)	3
Alcohol (C9-C11) poly (2.5-9) ethoxylate	2
Alcohol (C6-C17) (secondary) poly(3-6)ethoxylates	3
Alcohol (C6-C17) (secondary) poly(7-12)ethoxylates	3
Alcohol (C12-C16) poly(1-6)ethoxylates	2
Alcohol (C12-C16) poly(20+)ethoxylates	2
Alcohol (C12-C16) poly(7-19)ethoxylates	3
Alcohol (C12-C14) poly(2)ethoxylate sulfate, sodium salt	k.A.
Alcoholic beverages	1
Alcohols (C12+), primary, linear	2
Alcohols (C8-C11), primary, linear and essentially linear	2
Alcohols (C10-C14) , linear	2
Alcohols (C12-C13), primary, linear and essentially linear	2
Alcohols (C13+)	2
Alcohols (C14-C18), primary, linear and essentially linear	2
Alcohols (C16+), linear	2
Alkanes (C6-C9)	2
n-Alkanes (C10+)	3
Alkanes (C10-C26), linear and branched	3
Iso- and cyclo-alkanes (C10-C11)	1
Iso- and cyclo-alkanes (C12+)	1
Alkaryl polyethers (C9-C20)	2
Alkenyl (C11+) amide	2
Alkenyl (C16-C20) succinic anhydride	2
Alkyl acrylate-vinylpyridine copolymer in toluene	3
Alkyl(C8+)amine, Alkenyl (C12+) acid ester mixture	3
Alkylaryl phosphate mixtures (more than 40% Diphenyl tolyl phosphate, less than 0.02% ortho-isomers)	1
Alkylated (C4-C9) hindered phenols	2

Alkylbenzene, alkylindane, alkylindene mixture (each C12-C17)	2
Alkyl benzene distillation bottoms	2
Alkylbenzene mixtures (containing at least 50% of toluene)	3
Alkylbenzene sulphonic acid, sodium salt solution	3
Alkylbenzenes mixture (containing less than 1% naphthalene)	3
Alkylbenzenes mixture (containing naphthalene)	3
Alkyl (C3-C4) benzenes	2
Alkyl (C5-C8) benzenes	2
Alkyl (C9+) benzenes	1
Alkyl (C11-C17) benzene sulphonic acid	2
Alkyl (C12+) dimethylamine	3
Alkyl dithiocarbamate (C19-C35)	0
Alkyldithiothiadiazole (C6-C24)	2
Alkyl ester copolymer (C4-C20)	2
Alkyl (C8-C10)/(C12-C14):(40% or less/60% or more) polyglucoside solution (55% or less)	3
Alkyl (C8-C10)/(C12-C14):(60% or more/40% or less) polyglucoside solution (55% or less)	2
Alkyl naphthalenes (containing less than 1% naphthalene), crude	3
Alkyl naphthalenes (containing naphthalenes), crude	3
Alkyl (C7-C9) nitrates	3
Alkyl (C7-C11) phenol poly(4-12) ethoxylate	2
Alkyl (C8-C40) phenol sulphide	1
Alkyl (C8-C9) phenylamine in aromatic solvents	2
Alkyl (C9-C15) phenyl propoxylate	2
Alkyl (C8-C10)/(C12-C14):(50%/50%) polyglucoside solution (55% or less)	3
Alkyl (C12-C14) polyglucoside solution (55% or less)	3
Alkyl (C8-C10) polyglucoside solution (65% or less).	2
Alkyl (C10-C20, saturated and unsaturated) phosphite	2
Alkyl sulphonic acid ester of phenol	0
Alkyltoluenesulfonic acid (in mineral oil)	3
Alkyl (C18+) toluenes	2
Alkyl (C18-C28)toluenesulfonic acid, calcium salts, borated (up to 70% in mineral oil)	2
Alkyltoluenesulfonic acid, calcium salts, low overbase	3
Alkyltoluenesulfonic acid, calcium salts	2
Allyl alcohol	3
Allyl chloride	3
Aluminium chloride (30% or less)/Hydrochloric acid (20% or less) solution	3
Aluminium sulphate solution	3
2-(2-Aminoethoxy) ethanol	3
Aminoethyldiethanolamine/Aminoethylethanolamine solution	3
Aminoethyl ethanolamine	3
N-Aminoethylpiperazine	3
2-Amino-2-hydroxymethyl-1,3-propanediol solution (40% or less)	k.A.
2-Amino-2-methyl-1-propanol	3
Ammonia aqueous (28% or less)	3
Ammonium bisulphite solution (70% or less)	2
Ammonium chloride solution (less than 25%)	2
Ammonium hydrogen phosphate solution	1

Ammonium lignosulphonate solutions	0
Ammonium nitrate solution (93% or less)	2
Ammonium polyphosphate solution	1
Ammonium sulphate solution	0
Ammonium sulphide solution (45% or less)	2
Ammonium thiocyanate (25% or less)/Ammonium thiosulphate (20% or less) solution	k.A.
Ammonium thiosulphate solution (60% or less)	1
Amyl acetate (all isomers)	2
n-Amyl alcohol	3
Amyl alcohol, primary	2
sec-Amyl alcohol	2
tert-Amyl alcohol	3
tert-Amyl ethyl ether (TAEE)	2
tert-Amyl methyl ether	2
Aniline	3
Apple juice	0
Aryl polyolefins (C11-C50)	2
L-Aspartic acid, homopolymer, sodium salt	0
Aviation alkylates (C8 paraffins and iso-paraffins BPT 95 - 120°C)	2

**B**

Barium long chain (C11-C50) alkaryl sulphonate	2
Benzene and mixtures having 10% benzene or more	3
Benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl), 4-hydroxy-C7-C9 alcohols branched and linear	2
Benzene sulphonyl chloride	3
Benzenetricarboxylic acid, trioctyl ester	2
Benzyl acetate	2
Benzyl alcohol	2
Benzyl chloride	3
N,N-bis(2-hydroxyethyl) oleamide	2
Borax	3
Boric acid	3
Brake fluid base mix: Poly(2-8)alkylene (C2-C3) glycols/Polyalkylene (C2-C10) glycols monoalkyl (C1-C4) ethers and their borate esters	2
Bromochloromethane	1
1-Bromopropane	2
Butene oligomer	2
Butyl acetate (all isomers)	2
Butyl acrylate (all isomers)	2
Butyl alcohol (all isomers)	3
n-Butyl alcohol	3
sec-Butyl alcohol	2
tert-Butyl alcohol	3
Butylamine (all isomers)	3
Butylbenzene (all isomers)	2
Butyl benzyl phthalate	3
Butyl butyrate (all isomers)	2
Butyl/Decyl/Cetyl/Eicosyl methacrylate mixture	2
Butylene glycol	1

1,2-Butylene oxide	3
n-Butyl ether	2
Butyl methacrylate	2
Butyl octyl phthalate	2
n-Butyl propionate	2
Butyl stearate	2
Butyraldehyde (all isomers)	3
Butyric acid	3
gamma-Butyrolactone	3
<b>C</b>	
Calcium alkyl (C9) phenol sulphide/Polyolefin phosphorosulphide mixture	k.A.
Calcium alkyl (C10-C28) salicylate	2
Calcium carbonate slurry	2
Calcium hydroxide slurry	2
Calcium hypochlorite solution (15% or less)	3
Calcium hypochlorite solution (more than 15%)	3
Calcium lignosulphonate solutions	0
Calcium long-chain alkaryl sulphonate (C11-C50)	2
Calcium long-chain alkyl(C5-C10) phenate	1
Calcium long-chain alkyl(C11-C40) phenate	2
Calcium long-chain alkyl phenate sulphide (C8-C40)	2
Calcium long-chain alkyl phenolic amine (C8-C40)	2
Calcium long-chain alkyl salicylate (C13+)	3
Calcium long-chain alkyl (C18-C28) salicylate	3
Calcium nitrate/Magnesium nitrate/Potassium chloride solution	1
Calcium nitrate solutions (50% or less)	1
Camphor oil	2
epsilon-Caprolactam (molten or aqueous solutions)	3
Carbolic oil	3
Carbon disulphide	3
Carbon tetrachloride	3
Cashew nut shell oil (untreated)	3
Castor oil	2
Cesium formate solution	2
Cetyl/Eicosyl methacrylate mixture	2
Chlorinated paraffins (C10-C13)	3
Chlorinated paraffins (C10-C13) (60% chlorine or less)	3
Chlorinated paraffins (C14-C17) (with 50% chlorine or more, and less than 1% C13 or shorter chains)	3
Chlorinated paraffins (C18+) with any level of chlorine	3
Chloroacetic acid (80% or less)	3
Chlorobenzene	2
Chloroform	3
Chlorohydrins (crude)	3
N-(3-Chloro-2-hydroxypropyl)trimethyl ammonium chloride solution (75% or less)	3
4-Chloro-2-methylphenoxyacetic acid, dimethylamine salt solution	2
o-Chloronitrobenzene	2
1-(4-Chlorophenyl)-4,4- dimethyl-pentan-3-one	1
2- or 3-Chloropropionic acid	3

Chlorosulphonic acid	3
m-Chlorotoluene	2
o-Chlorotoluene	2
p-Chlorotoluene	2
Chlorotoluenes (mixed isomers)	2
Choline chloride solutions	0
Citric acid (70% or less)	3
Clay slurry	0
Coal slurry	0
Coal tar	3
Coal tar naphtha solvent	3
Coal tar pitch (molten)	3
Cobalt naphthenate in solvent naphtha	3
Cocoa butter	2
Coconut acid oil	2
Coconut fatty acid destillate	2
Coconut oil	2
Coconut oil fatty acid	2
Coconut oil fatty acid methyl ester	2
Copper salt of long chain (C17+) alkanolic acid	2
Corn Oil	2
Cotton seed oil	2
Creosote (coal tar)	3
Creosote (wood)	3
Cresols (all isomers)	3
Cresylic acid, dephenolized	3
Cresylic acid, sodium salt solution	3
Crotonaldehyde	3
Crude Piperazine	3
1,5,9-Cyclododecatriene	3
Cycloheptane	2
Cyclohexane	2
Cyclohexanol	2
Cyclohexanone	2
Cyclohexanone, Cyclohexanol mixture	2
Cyclohexyl acetate	2
Cyclohexylamine	3
1,3-Cyclopentadiene dimer (molten)	2
Cyclopentane	2
Cyclopentene	2
p-Cymene	2
<b>D</b>	
Decahydronaphthalene	1
Decane	1
Decanoic acid	2
Decene	3
Decyl acetate	1
Decyl acrylate	2
Decyl alcohol (all isomers)	2
Decyloxytetrahydrothiophene dioxide	2

Dextrose solution	0
Diacetone alcohol	2
Dialkyl (C8-C9) diphenylamines	0
Dialkyl (C7-C13) phthalates	3
Dialkyl (C9 - C10) Phthalates	2
Dialkyl thiophosphates sodium salts solution	2
Dibromomethane	1
Dibutylamine	3
Dibutyl hydrogen phosphate	3
2,4-Di-tert-butylphenol	k.A.
2,6-Di-tert-butylphenol	2
Dibutyl phthalate	3
Dibutyl Terephthalate	0
Dichlorobenzene (all isomers)	3
3,4-Dichloro-1-butene	3
1,1-Dichloroethane	2
Dichloroethyl ether	3
1,6-Dichlorohexane	0
2,2'-Dichloroisopropyl ether	2
Dichloromethane	3
2,4-Dichlorophenol	3
2,4-Dichlorophenoxyacetic acid, diethanolamine salt solution	3
2,4-Dichlorophenoxyacetic acid, dimethylamine salt solution (70% or less)	3
2,4-Dichlorophenoxyacetic acid, triisopropanolamine salt solution	3
1,1-Dichloropropane	1
1,2-Dichloropropane	2
1,3-Dichloropropane	k.A.
1,3-Dichloropropene	3
Dichloropropene/Dichloropropane mixtures	3
2,2-Dichloropropionic acid	3
Dicyclopentadiene, Resin Grade, 81-89%	3
Diethanolamine	3
Diethylamine	3
Diethylaminoethanol	3
2,6-Diethylaniline	2
Diethylbenzene	2
Di-(2-ethylbutyl) phthalate	3
Diethylene glycol	2
Diethylene glycol dibutyl ether	1
Diethylene glycol diethyl ether	2
Diethylene glycol initiated polyoxypropylene diamine	3
Diethylene glycol phthalate	2
Diethylenetriamine	3
Diethylenetriaminepentaacetic acid, pentasodium salt solution	0
Diethyl ether	2
Di-(2-ethylhexyl) adipate	3
Di-(2-ethylhexyl) phosphoric acid	2
Di-(2-ethylhexyl) phthalate	3
Diethyl phthalate	1
Diethyl sulphate	3
Diglycidyl ether of bisphenol A	2

Diglycidyl ether of bisphenol F	3
Diheptyl phthalate	3
Di-n-hexyl adipate	1
Dihexyl phthalate	3
1,4-Dihydro-9,10-dihydroxyanthracene, disodium salt solution	k.A.
Diisobutylamine	3
Diisobutylene	2
Diisobutyl ketone	2
Diisobutyl phthalate	3
Diisodecyl phthalate	2
Diisoheptyl phthalate	3
Diisononyl adipate	2
Diisononyl phthalate	2
Diisooctyl phthalate	2
Diisopropanolamine	3
Diisopropylamine	3
Diisopropylbenzene (all isomers)	2
1,3-Diisopropyl benzene	2
Diisopropylnaphthalene	2
N,N-Dimethylacetamide	2
N,N-Dimethylacetamide solution (40% or less)	2
Dimethyl adipate	2
Dimethylamine solution (45% or less)	3
Dimethylamine solution (greater than 45% but not greater than 55%)	3
Dimethylamine solution (greater than 55% but not greater than 65%)	3
N,N-Dimethylcyclohexylamine	3
Dimethyl disulphide	2
N,N-Dimethyldodecylamine	3
Dimethylethanolamine	3
Dimethylformamide	3
Dimethyl glutarate	3
Dimethyl hydrogen phosphite	1
Dimethyl octanoic acid	2
Dimethyl phthalate	1
Dimethylpolysiloxane	1
2,2-Dimethylpropane-1,3-diol (molten or solution)	2
Dimethyl succinate	2
Dinitrotoluene (molten)	3
Dinonyl phthalate	2
Diocetyl phthalate	2
1,4-Dioxane	3
Dipentene	3
Diphenyl	2
Diphenylamine (molten)	1
Diphenylamine, reaction product with 2,2,4-Trimethylpentene	3
Diphenylamines, alkylated	3
Diphenyl/Diphenyl ether mixtures	1
Diphenyl ether	1
Diphenyl ether/Diphenyl phenyl ether mixture	1
Diphenylmethane diisocyanate	3
Diphenylol propane-epichlorohydrin resins	2

Di-n-propylamine	3
Dipropylene glycol	1
Dipropylene glycol dibenzoate	k.A.
Di-n-propyl phthalate	3
Dithiocarbamate ester (C7-C35)	1
Ditridecyl adipate	2
Ditridecyl phthalate	2
Diundecyl phthalate	2
Dodecane (all isomers)	2
tert-Dodecanethiol	3
Dodecene (all isomers)	3
Dodeceny succinic acid, dipotassium salt solution	k.A.
Dodecyl alcohol	2
Dodecylamine/Tetradecylamine mixture	3
Dodecylbenzene	2
Dodecyl diphenyl ether disulphonate solution	3
Dodecyl hydroxypropyl sulphide	0
Dodecyl methacrylate	1
Dodecyl/Octadecyl methacrylate (mixture)	2
Dodecyl/Pentadecyl methacrylate mixture	2
Dodecyl phenol	3
Dodecyl Xylene	2
Drilling brines (containing zinc salts)	3
Drilling brines, including:calcium bromide solution, calcium chloride solution and sodium chloride solution	2
<b>E</b>	
Epichlorohydrin	3
Ethanolamine	3
2-Ethoxyethanol	3
2-Ethoxyethyl acetate	3
Ethoxylated long chain (C16+) alkyloxyalkylamine	3
Ethoxylated tallow amine (>95%)	3
Ethoxylated tallow amine, glycol mixture	3
Ethyl acetate	2
Ethyl acetoacetate	1
Ethyl acrylate	3
Ethyl alcohol	2
Ethylamine	3
Ethylamine solutions (72% or less)	3
Ethyl amyl ketone	2
Ethylbenzene	3
N-Ethylbutylamine	3
Ethyl tert-butyl ether	2
Ethyl butyrate	2
Ethylcyclohexane	2
N-Ethylcyclohexylamine	3
S-Ethyl dipropylthiocarbamate	3
Ethylene carbonate	2
Ethylene chlorohydrin	3
Ethylene cyanohydrin	2

Ethylenediamine	3
Ethylenediaminetetraacetic acid, tetrasodium salt solution	2
Ethylene dibromide	3
Ethylene dichloride	3
Ethylene glycol	3
Ethylene glycol acetate	3
Ethylene glycol butyl ether acetate	1
Ethylene glycol diacetate	1
Ethylene glycol methyl butyl ether	k.A.
Ethylene glycol methyl ether acetate	3
Ethylene glycol monoalkyl ethers	2
Ethylene glycol phenyl ether	2
Ethylene glycol phenyl ether/Diethylene glycol phenyl ether mixture	2
Ethylene oxide	3
Ethylene oxide/Propylene oxide mixture with an ethylene oxide content of not more than 30% by mass	3
Ethylene-Vinyl acetate copolymer (emulsion)	k.A.
Ethyl-3-ethoxypropionate	2
2-Ethylhexanoic acid	3
2-Ethylhexyl acrylate	3
2-Ethylhexylamine	3
2-Ethylhexyl esters of fatty acids	1
2-Ethyl-2-(hydroxymethyl) propane-1,3-diol (C8-C10) ester	2
Ethylidene norbornene	2
Ethyl isoamyl ketone	2
Ethyl methacrylate	2
N-Ethylmethylallylamine	3
o-Ethylphenol	k.A.
Ethyl propionate	2
2-Ethyl-3-propylacrolein	3
Ethyl toluene	2
<b>F</b>	
Fatty acid (saturated C13+)	2
Fatty acid methyl esters	2
Fatty acids, (C8-C10)	k.A.
Fatty acids, (C8-C18)	3
Fatty acids, (12+)	2
Fatty acids, unsaturated, linear, C16+	2
Fatty acids, essentially linear, (C6-C18) 2-ethylhexyl ester	2
Ferric chloride solutions	3
Ferric hydroxyethylethylenediaminetriacetic acid, trisodium salt solution	1
Ferric nitrate / Nitric acid solution	3
Fish oil	2
Fish solubles (water-based fish meal extract)	k.A.
Fluorosilicic acid	3
Fluorosilicic acid (20-30%) in water solution	3
Formaldehyde, polymer with isobutyleneated phenol	k.A.
Formaldehyde solutions (45% or less)	3
Formamide	3
Formic acid	3

Formic acid mixture (containing propionic acid 0% - 18% and sodium formate)	3
Fumaric adduct of rosin, water dispersion	k.A.
Furfural	3
Furfuryl alcohol	2
<b>G</b>	
[Glucitol/glycerol blend, propoxylated containing less than 10% amines]	2
Glucose solution	0
Glutaraldehyde solutions (50% or less)	3
Glycerine	1
Glycerine (83%), Dioxanedimethanol (17%) mixture	1
Glycerol ethoxylated	0
Glycerol monooleate	2
Glycerol propoxylated	2
Glycerol, propoxylated and ethoxylated	2
Glycerol/sorbitol blend, propoxylated and ethoxylated	k.A.
Glycerol/sucrose blend, propoxylated and ethoxylated	0
Glyceryl triacetate	1
Glycidyl ester of C10 trialkylacetic acid	2
Glycine, sodium salt solution	1
Glycolic acid solution (70% or less)	3
Glyoxal solution (40% or less)	3
Glyoxylic acid solution (50 % or less)	3
Glyphosate solution (not containing surfactant)	3
Groundnut oil	2
<b>H</b>	
Heptane (all isomers)	2
n-Heptanoic acid	3
1-Heptanol	2
Heptanol (all isomers)	2
Heptene (all isomers)	2
1-Heptene	2
Heptyl acetate	2
1-Hexadecylnaphthalene / 1,4-bis(hexadecyl)naphthalene mixture	2
1,3,5-Hexahydrotriethanol-1,3,5-triazine	k.A.
Hexamethylenediamine	3
Hexamethylenediamine adipate (50% in water)	0
Hexamethylenediamine (molten)	3
Hexamethylenediamine solution	3
Hexamethylene diisocyanate	3
Hexamethylene glycol	1
Hexamethyleneimine	2
Hexamethylenetetramine solutions	2
Hexane	2
Hexane (all isomers)	2
1,6-Hexanediol, distillation overheads	2
Hexanoic acid	3
Hexanol	3
Hexene (all isomers)	2

1-Hexene	2
2-Hexene (mixed isomers)	2
Hexyl acetate	2
Hexylene glycol	2
Hydrocarbon waxes	2
Hydrochloric acid	3
Hydrogenated starch hydrolysate	0
Hydrogen peroxide, more than 60%	3
Hydrogen peroxide, more than 8% but not more than 60%	3
Hydrogen peroxide solutions (over 60% but not over 70% by mass)	3
Hydrogen peroxide solutions (over 8% but not over 60% by mass)	3
2-Hydroxyethyl acrylate	3
N-(Hydroxyethyl)ethylenediaminetriacetic acid, trisodium salt solution	3
2-Hydroxy-4-(methylthio)butanoic acid	3
<b>I</b>	
Icosa(oxypropane-2,3-diyl)s	2
Illipe oil	2
Interesterified Mixed Vegetable Oil	2
Isoamyl alcohol	2
Isobutyl alcohol	3
Isobutyl formate	2
Isobutyl methacrylate	2
Isononylaldehyde	2
Isobutyric acid	k.A.
Isophorone	2
Isophoronediamine	3
Isophorone diisocyanate	3
Isoprene	3
Isopropanolamine	3
Isopropyl acetate	2
Isopropyl alcohol	2
Isopropylamine	3
Isopropylamine (70% or less) solution	3
Isopropylbenzene	2
Isopropylcyclohexane	2
Isopropyl ether	2
<b>J</b>	
Jatropha oil	2
<b>K</b>	
Kaolin slurry	0
<b>L</b>	
Lactic acid	3
Lactonitrile solution (80% or less)	3
Lard	2
Latex, ammonia (1% or less), inhibited	1
Latex: Carboxylated styrene-Butadiene copolymer; Styrene-Butadiene rubber	1

Lauric acid	2
Lauryl polyglucose (50% or less)	3
Lecithin	0
Ligninsulphonic acid, sodium salt solution	0
Linear alkyl (C12-C16) propoxyamine ethoxylate	3
Linseed oil	2
Long-chain alkaryl polyether (C11-C20)	2
Long-chain alkaryl sulphonic acid (C16-C60)	2
Long-chain alkylphenate/Phenol sulphide mixture	3
Long-chain polyetheramine in alkyl (C2-C4) benzenes	2
Long-chain polyetheramine in aromatic solvent	2
L-Lysine solution (60% or less)	1
<b>M</b>	
Magnesium chloride solution	0
Magnesium hydroxide slurry	1
Magnesium lignosulphonate solutions	0
Magnesium long-chain alkaryl sulphonate (C11-C50)	3
Magnesium long-chain alkyl salicylate (C11+)	2
Maleic acid/allyl sulfonic acid copolymer, containing carboxylate, phosphonate & sulfonate groups, partial sodium salt	0
Maleic anhydride	3
Maleic anhydride – sodium allylsulfonate copolymer	0
Maltitol Syrup	0
Mango kernel oil	2
Mercaptobenzothiazol, sodium salt solution	2
Mesityl oxide	2
Metam sodium solution	2
Methacrylic acid - alkoxy poly (alkylene oxide) methacrylate copolymer, sodium salt aqueous solution (45% or less)	1
Methacrylic acid	3
Methacrylic resin in Ethylene dichloride	3
Methacrylonitrile	3
3-Methoxy-1-butanol	1
3-Methoxybutyl acetate	1
N-(2-Methoxy-1-methyl ethyl)-2-ethyl-6-methyl chloroacetanilide	2
Methyl acetate	2
Methyl acetoacetate	2
Methyl acrylate	3
Methylal (>=85%)	
Methyl alcohol	3
Methylamine solutions (42% or less)	3
Methylamyl acetate	2
Methylamyl alcohol	3
Methyl amyl ketone	2
N-Methylaniline	2
Alpha-Methylbenzyl alcohol with acetophenone (15% or less)	3
Methylbutenol	2
Methyl tert-butyl ether	2
Methyl butyl ketone	3
Methylbutynol	2

Methyl butyrate	2
Methylcyclohexane	2
Methylcyclopentadiene dimer	2
Methylcyclopentadienyl manganese tricarbonyl	3
Methyl diethanolamine	2
Methylene bithiocyanate	3
2-Methyl-6-ethyl aniline	2
Methyl ethyl ketone	2
2-Methyl-5-ethyl pyridine	3
Methyl formate	2
N-Methylglucamine solution (70% or less)	3
2-Methylglutaronitrile with 2-Ethylsuccinonitrile (12% or less)	2
Methyl heptyl ketone	k.A.
2-Methyl-2-hydroxy-3-butyne	2
Methyl isobutyl ketone	3
Methyl methacrylate	2
3-Methyl-3-methoxybutanol	2
3-Methyl-3-methoxybutyl acetate	k.A.
Methyl naphthalene (molten)	2
2-Methylpentane	2
2-Methyl-1,3-propanediol	0
Methyl propyl ketone	2
2-Methylpyridine	3
3-Methylpyridine	3
4-Methylpyridine	3
N-Methyl-2-pyrrolidone	3
Methyl salicylate	3
alpha-Methylstyrene	3
3-(methylthio)propionaldehyde	3
Microsilica slurry	0
Molasses	0
Molybdenum polysulfide long chain alkyl dithiocarbamide complex.	2
Morpholine	3
Motor fuel anti-knock compounds (containing lead alkyls)	3
Myrcene	2
<b>N</b>	
Nalco 5740S Antifoam	k.A.
Naphthalene (molten)	3
Naphthalenesulphonic acid-Formaldehyde copolymer, sodium salt solution	1
Naphthenic acids	k.A.
Neodecanoic acid	2
Nitrating acid (mixture of sulphuric and nitric acids)	3
Nitric acid (70% and over)	3
Nitric acid (less than 70%)	3
Nitrilotriacetic acid, trisodium salt solution	3
Nitrobenzene	3
Nitroethane	2
Nitroethane (80%)/ Nitropropane (20%)	2
Nitroethane, 1-Nitropropane (each 15% or more) mixture	2

o-Nitrophenol (molten)	1
1-Nitropropane	2
1- or 2-Nitropropane	3
2-Nitropropane	3
Nitropropane (60%)/Nitroethane (40%) mixture	3
o-Nitrotoluene	3
p-Nitrotoluene	3
o- or p-Nitrotoluenes	3
Nonane (all isomers)	2
Nonanoic acid (all isomers)	3
Nonene (all isomers)	2
1-Nonene	2
Nonyl acetate	k.A.
Nonyl alcohol (all isomers)	2
Nonyl methacrylate monomer	1
Nonylphenol	3
Nonylphenol poly(4+)ethoxylate	2
<b>O</b>	
Octamethylcyclotetrasiloxane	1
Octane (all isomers)	2
Octanoic acid (all isomers)	3
Octanol (all isomers)	2
1-Octanol	2
iso-Octanol	2
Octene (all isomers)	2
n-Octyl acetate	1
Octyl aldehydes	1
Octyl decyl adipate	2
Olefin-Alkyl ester copolymer (molecular weight 2000+)	2
Olefin mixtures (C5-C7)	2
Olefin mixtures (C5-C15)	2
Olefin mixtures (C7-C9) C8 rich, stabilized	2
Olefins (C13+, all isomers)	2
alpha-Olefins (C6-C18) mixtures	2
Oleic acid	2
Oleum	3
Oleylamine	3
Olive oil	2
Orange juice	0
Orange juice (not concentrated)	0
Oxatetra-azahydroxyalkanoic acid, substituted with acetic acid / acetoxy-ethanolamine	0
Oxygenated aliphatic hydrocarbon mixture	2
<b>P</b>	
Palm acid oil	2
Palm fatty acid distillate	2
Palm kernel acid oil	2
Palm kernel fatty acid distillate	2
Palm kernel oil	2

Palm kernel olein	2
Palm kernel stearin	2
Palm Mid Fraction	2
Palm oil	2
Palm oil (containing more than 15% and less than 30% free fatty acids)	2
Palm oil fatty acid methyl ester	2
Palm olein	2
Palm stearin	2
Paraffin wax	2
Paraldehyde	3
Paraldehyde-ammonia reaction product	3
Pentachloroethane	3
1,3-Pentadiene	2
1,3-Pentadiene (greater than 50%), cyclopentene and isomers, mixtures	3
Pentaethylenehexamine	3
Pentane (all isomers)	2
Pentanoic acid	3
n-Pentanoic acid (64%)/ 2-Methyl butyric acid (36%) mixture	3
Pentasodium triphosphate	k.A.
Pentene (all isomers)	2
1-Pentene	2
2-Pentene	2
iso-Pentene	2
n-Pentyl propionate	2
Perchloroethylene	3
Petrolatum	2
Phenol	3
1-Phenyl-1-xylyl ethane	1
Phosphate esters, alkyl (C12-C14) amine	2
Phosphoric acid	3
Phosphorus, yellow or white	2
Phthalic anhydride (molten)	3
alpha-Pinene	3
beta-Pinene	3
Pine oil	3
Polyacrylic acid solution (40% or less)	1
Polyalkyl (C18-C22) acrylate in xylene	2
Polyalkylalkenaminesuccinimide, molybdenum oxysulphide	2
Poly(2-8)alkylene glycol monoalkyl (C1-C6) ether	2
Poly(2-8)alkylene glycol monoalkyl (C1-C6) ether acetate	2
Polyalkyl (C10-C20) methacrylate	2
Polyalkyl (C10-C18) methacrylate/ethylene-propylene copolymer mixture	3
Polyaluminium chloride solution	1
Polybutene	2
Polybutenyl succinimide	2
Poly(2+)cyclic aromatics	3
Polyether (molecular weight 2000+)	2
Polyetheramine	3
Polyether, borated	1
Polyethylene glycol	1
Polyethylene glycol dimethyl ether	1

Polyethylene polyamines	0
Polyethylene polyamines (more than 50% C5-C20 paraffin oil)	0
Polyferric sulphate solution	3
Polyglycerin, sodium salt solution (containing less than 3% sodium hydroxide)	3
Polyglycerol	0
Poly(iminoethylene)-graft-N-poly(ethyleneoxy) solution (90% or less)	1
Polyisobutenamine in aliphatic (C10-C14) solvent	2
Polyisobutenyl anhydride adduct	1
Poly(4+)isobutylene	2
Polymethylene polyphenyl isocyanate	2
Polyolefin (molecular weight 300+)	2
Polyolefin amide alkeneamine (C17+)	2
Polyolefin amide alkeneamine borate (C28-C250)	2
Polyolefin amide alkeneamine (C28+)	1
Polyolefin amide alkeneamine/molybdenum oxysulphide mixture	k.A.
Polyolefin amide alkeneamine polyol	3
Poly (17+) olefin amine	2
Polyolefinamine (C28-C250)	2
Polyolefinamine in alkyl (C2-C4) benzenes	2
Polyolefinamine in aromatic solvent	2
Polyolefin aminoester salts (mw 2000+)	2
Polyolefin anhydride	2
Polyolefin ester (C28-C250)	2
Polyolefin phenolic amine (C28-C250)	2
Polyolefin phosphorusulphide, barium derivative (C28-C250)	0
Poly(20)oxyethylene sorbitan monooleate	1
Polyoxypropylene diamine	3
Poly(5+)propylene	1
Polypropylene glycol	1
Polysiloxane	1
Poly(tetramethylene ether) glycol (mw 600-3000)	0
Potassium chloride solution	0
Potassium chloride solution (less than 26%)	0
Potassium formate solutions	2
Potassium hydroxide solution	3
Potassium oleate	1
Potassium salt of polyolefin acid	0
Potassium thiosulphate (50% or less)	2
n-Propanolamine	3
2-Propene-1-aminium, N,N-dimethyl-N-2-propenyl-, chloride, homopolymer	1
Propionaldehyde	2
Propionic acid	3
Propionic anhydride	3
Propionitrile	3
n-Propyl acetate	1
n-Propyl alcohol	3
n-Propylamine	3
Propylbenzene	k.A.
Propylbenzene (all isomers)	2

n-Propyl chloride	2
Propylene-Butylene copolymer	0
Propylene carbonate	3
Propylene dimer	2
Propylene glycol	1
Propylene glycol methyl ether acetate	1
Propylene glycol monoalkyl ether	3
Propylene glycol phenyl ether	1
Propylene oxide	3
Propylene tetramer	1
Propylene trimer	2
Pyridine	3
Pyrolysis gasoline (containing benzene)	3
<b>Q</b>	
<b>R</b>	
Rapeseed oil	2
Rapeseed oil (low erucic acid containing less than 4% free fatty acids)	2
Rape seed oil fatty acid methyl esters	2
Resin oil, distilled	3
Rice bran oil	2
Rosin	2
Rosin soap (disproportionated) solution	k.A.
<b>S</b>	
Safflower oil	2
Shale oil	3
Shea butter (containing less than 15% Free Fatty Acids)	2
Sodium acetate solutions	1
Sodium alkyl (C14-C17) sulphonates (60-65% solution)	2
Sodium aluminate solution	3
Sodium aluminosilicate slurry	1
Sodium benzoate	1
Sodium bicarbonate solution (less than 10%)	0
Sodium borohydride (15% or less)/Sodium hydroxide solution	3
Sodium bromide solution (less than 50%)	3
Sodium carbonate solution	2
Sodium chlorate solution (50% or less)	2
Sodium dichromate solution (70% or less)	3
Sodium hydrogen sulphide (6% or less)/Sodium carbonate (3% or less) solution	1
Sodium hydrogen sulphite solution (45% or less)	0
Sodium hydrosulphide/Ammonium sulphide solution	2
Sodium hydrosulphide solution (45% or less)	2
Sodium hydroxide solution	3
Sodium hypochlorite solution (15% or less)	3
Sodium hypochlorite solution (full strength solution)	3
Sodium Methylate (21-30% in Methanol)	3
Sodium nitrate	1
Sodium nitrite solution	2

Sodium perborate monohydrate	3
Sodium petroleum sulphonate	2
Sodium poly(4+)acrylate solutions	1
Sodium silicate solution	3
Sodium sulphate solutions	1
Sodium sulphide solution (15% or less)	3
Sodium sulphite solution (25% or less)	1
Sodium tartrates/Sodium succinates solution	k.A.
Sodium thiocyanate solution (56% or less)	1
Sorbitan monooleate	2
Sorbitol solution	0
Soyabean oil	2
Stabilized Yeast Extract Solution	1
Styrene monomer	3
Sulphohydrocarbon (C3-C88)	2
Sulpholane	2
Sulphonated polyacrylate solution	0
Sulphur (molten)	1
Sulphuric acid	3
Sulphuric acid, spent	3
Sulphurized fat (C14-C20)	1
Sulphurized polyolefinamide alkene (C28-C250) amine	0
Sunflower seed oil	2
<b>T</b>	
Tall oil (crude and distilled)	2
Tall oil crude	2
Tall oil distilled	2
Tall oil fatty acid (resin acids less than 20%)	2
Tall oil fatty acid, barium salt	2
Tall oil pitch	2
Tall oil soap (disproportionated) solution	2
Tallow	2
Tallow fatty acid	2
Tetrachloroethane	2
n-Tetradecanoic acid	2
Tetraethylene glycol	1
Tetraethylene pentamine	3
Tetraethyl silicate monomer/oligomer (20% in ethanol)	2
Tetrahydrofuran	2
Tetrahydronaphthalene	2
Tetramethylbenzene (all isomers)	1
Tetrapotassium pyrophosphate	k.A.
Thixatrol Plus	1
Titanium dioxide slurry	1
Toluene	3
Toluenediamine	3
Toluene diisocyanate	3
o-Toluidine	3
Tolyl triazole	2
Tributyl phosphate	3

1,2,3-Trichlorobenzene (molten)	2
1,2,4-Trichlorobenzene	3
1,1,1-Trichloroethane	2
1,1,2-Trichloroethane	2
Trichloroethylene	3
1,2,3-Trichloropropane	3
1,1,2-Trichloro-1,2,2-Trifluoroethane	1
Tricresyl phosphate (containing 1% or more ortho-isomer)	2
Tricresyl phosphate (containing less than 1% ortho-isomer)	2
Tridecane	2
Tridecanoic acid	2
Tridecyl acetate	2
Triethanolamine	2
Triethylamine	3
Triethylbenzene	2
Triethylene glycol	1
Triethylenetetramine	3
Triethyl phosphate	2
Triethylphosphite	2
Triisopropanolamine	3
Triisopropylated phenyl phosphates	0
Trimethylacetic acid	2
Trimethylamine solution (30% or less)	3
Trimethylbenzene (all isomers)	2
Trimethylhexamethylenediamine (2,2,4- and 2,4,4-isomers)	3
Trimethylhexamethylene diisocyanate (2,2,4- and 2,4,4-isomers)	2
Trimethylolpropane polyethoxylate	k.A.
Trimethylol propane propoxylated	1
2,2,4-Trimethyl-1,3-pentanediol diisobutyrate	1
2,2,4-Trimethyl-1,3-pentanediol-1-isobutyrate	2
Trimethyl phosphite	k.A.
1,3,5-Trioxane	3
Tripropylene glycol	0
Trixylyl phosphate	2
Tung oil	2
Turpentine	2
<b>U</b>	
Undecanoic acid	2
1-Undecene	3
Undecyl alcohol	2
Urea	1
Urea/Ammonium mono- and di-hydrogen phosphate/Potassium chloride solution	k.A.
Urea/Ammonium nitrate solution	2
Urea/Ammonium nitrate solution (containing less than 1% free ammonia)	2
Urea/Ammonium phosphate solution	2
Urea formaldehyde resin solution	2
Urea solution	1
<b>V</b>	

Valeraldehyde (all isomers)	2
Vegetable acid oils	2
Vegetable fatty acid distillates (m)	2
Vegetable protein solution (hydrolysed)	0
Vinyl acetate	3
Vinyl ethyl ether	2
Vinylidene chloride	3
Vinyl neodecanoate	3
Vinyltoluene	3
<b>W</b>	
Water	0
Waxes	2
White spirit, low (15-20%) aromatic	3
Wood lignin with sodium acetate/oxalate	1
<b>X</b>	
Xylenes	2
Xylenes/ethylbenzene (10% or more) mixture	2
Xylenol	3
<b>Y</b>	
<b>Z</b>	
Zinc alkaryl dithiophosphate (C7-C16)	2
Zinc alkenyl carboxamide	2
Zinc alkyl dithiophosphate (C3-C14)	2
Zinc bromide solutions	3
Zinc chloride	3