BASE CHEMICALS (POLYMERS)

Chemical Resistance Data

Low Density Polyethylene (LDPE) and
Linear Low Density Polyethylene (LLDPE)

Overview

SASOL AT A GLANCE

Sasol is an international integrated chemicals and energy company that leverages technologies and the expertise of our 30 400 people working in 36 countries. We develop and commercialise technologies, and build and operate world-scale facilities to produce a range of high-value product streams, including liquid fuels, chemicals and low-carbon electricity.

BASE CHEMICALS

Base Chemicals is a producer and marketer of a range of commodity chemicals based on the Fischer Tropsch (FT) and natural gas value chains including chemical feedstocks of ethane, ethylene, propylene and ammonia. Final products include polymers, explosives, fertilisers, mining reagents (caustic soda, sodium cyanide), and a range of alcohols, ketones, acrylate monomers, and other oxygenated solvents.

Final products marketed through the Polymers division include low density polyethylene (LDPE), linear low density polyethylene (LLDPE), polypropylene (PP), and polyvinyl chloride (PVC) as well as propylene and ethylene monomers. Through this product portfolio we offer polymer solutions for a broad range of applications and industries.

Our polymers are marketed throughout Sub-Saharan Africa, Europe, Americas and Asia and we are active in over 75 countries globally.

Our Polymer Technology Services Centre in Johannesburg provides expertise and technical service support to external customers and also undertakes polymer-related applications research and development applicable to the Polymers division.

OVERVIEW

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Chemical Resistance Data

INTRODUCTION

Base Chemicals manufactures low density (LDPE), and linear low density (LLDPE) polyethylenes. These materials are particularly useful because of their insolubility in, and inertness to, a wide range of chemicals. The chemical resistance of Base Chemicals polyethylene resins is complementary to that of metals in that they are resistant to attack by inorganic acids, alkalis and aqueous solutions, which cause corrosion in metals, but they may be affected by organic solvents which usually have little, if any, effect on metals. At room temperature polyethylene is almost completely insoluble in all organic solvents although some absorption, softening or embrittlement may occur. At temperatures above 70°C polyethylene dissolves in common solvents such as xylene, toluene, amyl acetate, trichloroethylene, paraffin and turpentine, but is not dissolved by glycerine, ether, carbon disulphide, acetone or linseed oil.

The lower the melt index (MI) of polyethylene the better its resistance to chemical and solvent attack and to environmental stress cracking. Similarly as the density of polyethylene increases its resistance to chemical and solvent attack improves, while environmental stress cracking resistance (ESCR) is reduced. It is important, therefore, to use polyethylene of the lowest MI consistent with ease of fabrication and of the highest density consistent with the level of chemical resistance and ESCR required.

Polyethylenes are also highly resistant to permeation by many liquids and gases. The permeation rate decreases with an increase in polyethylene density and part wall thickness, and increases with rising temperature.

When considering the use of polyethylene to contain a substance, several factors need to be taken into account besides the effect of the substance itself. These factors include:

- container shape and design
- pressure development during storage
- changes of the substance with time
- extraction of additives from the polymer
- exposure of the container to ultraviolet light in addition to the chemical environment
- compounded effects on polyethylene from mixed substances
- changes in the polymer during processing
- storage temperature
- type of process used to make product
- effects of any additional additives incorporated prior to processing (e.g. pigment).

Chemical environmental effects on polyethylene may be divided into three categories: oxidation, stress cracking and plasticisation/swelling. Only oxidation causes a change in the molecular structure of the polymer, while all three effects alter the physical properties of the polymer.

OXIDATION

Chemical attack of polyethylene is mainly due to oxidation. It starts with the chemosorption of oxygen into the polymer chain. The source of the oxygen may be simply air; ozone or any oxidizing substance such as fuming nitric acid, fuming sulphuric acid (oleum), aqua regia, wet chlorine gas and liquid bromine. As oxidation continues the polymer molecules will be chemically modified by either chain scission or crosslinking.

These effects on polyethylene may be gradual and may not be measurable over the short term, but may be significant over the long term. Eventually oxidation will result in a reduction of physical properties until the polymer fails completely. Combined sources of oxidation, such as an oxidizing substance inside a container plus UV radiation on the outside, would accelerate degradation.

STRESS CRACKING

A stress crack is defined by ASTM D883 as "an external or internal crack in a plastic caused by tensile stresses less than its short-time mechanical strength".

The most common variations of stress cracking of polyethylene are as follows:

1. Environmental stress cracking, involving surface-initiated failure of polyaxially stressed polyethylene in the presence of surface active substances, such as alcohols, soaps or wetting agents.
2. Solvent cracking, induced by liquids which cause a weakening of the surface layers of the polymer (surface initiated).
3. Oxidative stress cracking involving air/oxygen and heat, and producing permanent chemical changes of the polyethylene (similar to oxidation but in addition involving stress).

4. Static fatigue failure (also brittle creep failure), occurring at ordinary ambient temperatures and stresses maintained below the short-time strength of the material.
In each variation polyaxial stresses are necessary to produce failure, while uniaxial stress can in fact improve the resistance of the polymer to cracking due to increased strength brought about by molecular orientation. Stress cracking is influenced by internal variables (i.e. polymer related) and external variables.

Internal variables include:
crystallinity of the polymer and growth of spherulites;
molecular weight;
molecular weight distribution
short chain branching, which influences density.

External variables include:
thermal history, i.e. processing temperatures, cooling rates, ambient temperature;
frozen-in stresses and strains;
voids, microcracks;
applied stress and strain.
It is obvious from the above that the selection of the polyethylene grade, design of the mould and correct processing conditions are very important factors in determining the compatibility of polyethylene with any substance and not just the chemical resistance of the polymer.

ABSORPTION OF SOLVENTS

At temperatures below 60°C polyethylene slowly absorbs solvents causing swelling, weight gain, softening and some loss of yield strength. At temperatures above 60°C the solubility of polyethylene in hydrocarbons and halogenated hydrocarbons rises sharply. These plasticising materials cause no actual chemical degradation of the resin, but affect the physical strength. Some chemicals such as benzene or other aromatic hydrocarbons have a strong plasticising action, whereas others such as petrol have a weaker effect.
Certain plasticisers are sufficiently volatile so that if they are removed from contact with the polyethylene the part will "dry out" and return to its original condition with no impairment of properties.

IMPORTANCE OF TESTING

It cannot be expected that one chemical resistance data chart will contain the effects of all chemicals on different types of polyethylene. Furthermore the suitability of Sasol Polymers polyethylene for a packaging application depends not only on the nature of the material to be packaged but also on the expected service temperature and stress, the duration of exposure and whether it is intermittent or continuous.
Because of the many variables involved, it must be recognised that standard laboratory tests can give only a general guide to whether materials may be packaged in polyethylene. Therefore, the feasibility of any packaging system must be determined by extensive laboratory tests carried out under conditions which approximate as closely as possible those expected in service.
The following procedure is recommended to determine the suitability of a polyethylene container for the packaging of a specific chemical:
1. Fill the container under evaluation with the chemical material to be packaged and immerse in it a pre-weighed standard ASTM tensile bar or suitable test specimen moulded from the same resin as the container. Weigh this whole system and expose it to the expected service temperature for a time equivalent to the desired shelf-life.
2. Re-weigh the system at the end of the test period to test for permeation of the chemical through the container walls.
3. Check for chemical degradation of the polyethylene by observing any surface crazing, cracking or discolouration of the inside container surfaces or tensile bar.
4. Re-weigh the tensile bar specimen to test for swelling due to absorption of the chemical by the polyethylene.
5. Perform the standard ASTM D 638 (according to ASTM D1248) test on the tensile bar to check for decreased tensile properties as indications of physical changes due to softening of the polyethylene.
6. To determine the environmental stress cracking characteristics of the chemical perform standard ASTM D1693 test for ESCR of ethylene plastics, substituting the chemical for the test liquid.
As an additional option the chemical may be returned to its manufacturer to assess any adverse effects due to prolonged contact with the polyethylene.

GUIDE TO CHEMICAL RESISTANCE TABLE

The chemical resistance data presented in the following table originated from reliable published sources (1,2,3). It contains information for low (LDPE) and linear low (LLDPE) density polyethylenes made by Sasol Polymers. This table is intended only as a preliminary, general guide to the resistance of Sasol Polymers polyethylenes to various chemicals. It should not be used by the plastics convertor as the basis for final decisions because the specific end-use application, part design and/or conditions of use may have added effects on part performance in a particular chemical environment. It is recommended that laboratory testing of the specific end-use application be conducted under actual service conditions.

Explanations of symbols and abbreviations

NA: negligible attack.

Material may change as follows:

Swelling:	<3%
Weight loss:	<0.5%
Decrease in elongation:	<10%

Should be suitable for service in these conditions.

LA: limited attack or resistance.

Material may change as follows:

Swelling:	3 – 8%
Weight loss:	0.5 – 5%
Decrease in elongation:	<50%

May be considered where alternative materials are unsatisfactory.
Customer should satisfy himself beforehand as to suitability.

EA: extensive attack.

Material may change as follows:

Swelling:	>8%
Weight loss:	>5%
Decrease in elongation:	>50%

Material is not suitable for use in these conditions.
D: Discoloured
Material may discolour but is not necessarily degraded.
This abbreviation is normally used with one of the above.

®: Registered trade mark

Abbreviations

tech.: technical(ly)
LLDPE : linear low density polyethylene
sol : solution
aq.: aqueous
ESCR : environmental stress crack resistance
conc : concentrated
SG : specific gravity
sat : saturated
MI : melt index
ppm : parts per million
ASTM : American Standard Test Method
LDPE : low density polyethylene

References

1. The chemical resistance of 'Alkathene' polyethylene, ICI Plastics Division TSNA101.
2. Guide to the packageability of substances in Union Carbide polyethylene.
3. Chemical resistance date sheets, Vol 1, Plastics, RAPRA.
4. Chemical Resistance, Volume 1 – Thermoplastics. Plastics Design Library 1994.

Note to table

The salts and their aqueous solutions whose chemical names can be composed from the two columns below are not included in the main table. These compounds have no influence on polyethylene. The name of the chemical is composed by taking any of the chemical elements in the first column and adding to this any of the names in the second column, e.g. aluminium chromate, sodium nitrate, zinc chloride, etc.

aluminium	acetate
ammonium	arsenate
antimony	benzoate
barium	borate
bismuth	bromate
cadmium	bromide
calcium	carbonate
chromium	chlorate
cobalt	chloride
copper	chromate
iron (ferric & ferrous)	dicarbonate
lead	dichromate
lithium	disulphate
magnesium	ferric cyanide
manganese	ferrous cyanide
mercury (mercuric & mercurous)	fluoride
molybdenum	formiate
nickel	gluconate
potassium	hydrosulphate
silver	hyposulphite
sodium	iodate
strontium	iodide
thallium	metaphosphate
tin (stannic & stannous)	molybdate
zinc	nitrate
	nitrite
	oxalate
	perborate
	persulphate
	phosphate
	rhodanide
	salicylate
	silicate
	silicofluoride
	sulphate
	sulphite
	tartrate
	thiosulphate
	titanate
	tungstate

Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Acetaldehyde*	40%	NA	LA	LA	EA
Acetaldehyde*	100%	LA	EA	LA	EA
Acetanilide		NA	NA	NA	NA
Acetic acid*	5%	NA	NA	NA	
Acetic acid*	10%	NA	NA	NA	NA
Acetic acid*	50%	NA	NA	NA	NA
Acetic acid*	70%	NA	NA	NA	L/EA
Acetic acid*	glacial	NA	LA/D	LA	EA
Acetic anhydride*	tech pure	EA	EA	EA	EA
Acetone	100%	NA	LA	LA	EA
Acetophenone		NA		LA	L/EA
Acetophenetidin		NA	NA	NA	NA
Acetyl chloride		LA		LA	LA
Acetylene		NA			
Acetylsalicylic acid		NA	NA	NA	NA
Acids, aromatic		NA	LA	NA	
Acrylic acid		NA		NA	
Acrylic emulsions		NA		NA	
Acrylonitrile	tech pure	NA	NA	NA	
Adipic ester		NA	LA		
Adipic acid, aq.	sat	NA	NA	NA	NA
Alcohol		NA		NA	
Alcohol, allyl*	96%	NA	NA	NA	EA
Alcohol, amyl*		NA		NA	LA
Alcohol, benzyl*				EA	
Alcohol, butyl*		NA	NA	NA	
Alcohol, cetyl*		NA	NA	NA	NA
Alcohol, ethyl*	40%	NA		NA	EA
Alcohol, ethyl*	100%	NA	NA	NA	EA
Alcohol, furfuryl*		EA		EA	
Alcohol, hexyl*		NA	NA	NA	NA
Alcohol. isobutyl*		NA	NA	NA	NA
Alcohol, isopropyl*		NA	NA	NA	
Alcohol, lauryl*		NA	NA	NA	NA
Alcohol, methyl*	6%	NA		NA	
Alcohol, methyl*	100%	NA	NA	NA	LA
Alcohol, nonyl*		NA	NA	NA	LA
Alcohol, octyl*		NA	EA	LA	EA
Alcohol, propargyl*	7%	NA	NA	LA	
Allyl acetate		NA	N/LA	EA	
Allyl alcohol*		NA	NA	EA	
Allyl chloride		LA	EA	EA	EA
Alum	any	NA	NA	NA	NA
Aluminium hydroxide		NA	NA	NA	NA
Aluminium oxide		NA		NA	

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NA: negligible attack
*: stress cracking agent
LA: limited attack
aq.: aqueous
EA: extensive attack
sat: saturated
D: discoloured
sol: solution

Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Aluminium oxychloride		NA	NA	NA	NA
Aluminium potassium sulphate		NA	NA	NA	NA
Aluminium salts	see introduction				
Amino acids		NA	NA	NA	
Ammonia	0.88 SG sol	NA	NA	NA	NA
Ammonia	dry gas	NA	NA	NA	NA
Ammonium bicarbonate		NA	NA	NA	NA
Ammonium bifluoride		NA	NA	NA	NA
Ammonium hydrogen carbonate		NA	NA		
Ammonium hydrosulphide	all	NA	NA	NA	NA
Ammonium hydroxide	10%	NA	NA	NA	NA
Ammonium hydroxide	28%	NA	NA	NA	NA
Ammonium salts	see introduction				
Ammonium sulphide, aq.	all	NA	NA	NA	
Ammonium thiocyanate		NA	NA	NA	NA
Amyl acetate*	tech pure	EA	EA	EA	
Amyl alcohol*	tech pure	LA	LA	LA	EA
Amyl chloride	100%	EA	EA	EA	
Amyl phthalate		NA	LA		
Aniline*. aq.	all	EA	EA	EA	
Aniline dyes, dry	water sol	NA		NA	
Aniline dyes, dry	oil sol	NA		NA	
Aniline hydrochloride	all	NA	NA	EA	
Aniline hydroxide				EA	
Aniline salts		NA		NA	
Aniline sulphate				EA	
Animal oils		NA	LA	LA	EA
Aniseed oil		LA	EA	EA	
Anisole		LA	L/EA	EA	
Anone (Cyclohexaxone)		NA	LA	EA	
Anthraquinone disulphonic acid		NA	NA	NA	
Antifreeze solutions	commercial	NA	NA	NA	
Antimony		NA		NA	
Antimony pentachloride		NA	NA	NA	NA
Antimony salts	see introduction				
Antimony trichloride		NA	NA	NA	NA
Apple juice		NA		NA	
Aqua regia	conc	EA		EA	
Arcton 6®				LA	
Argyrol		NA		NA	
Aromatic hydrocarbons*		EA		EA	
Aromatic oils		LA	EA		
Arsenic		NA		NA	
Arsenic acid anhydride		NA	NA	NA	NA
Arsenic acid, aq.		NA	NA	NA	NA

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Reagent	Concentration	LLDPE > 930kg/m^3		LDPE/LLDPE < 930kg/m^3	
		20°C	60°C	20°C	60°C
Arsenic trioxide		NA		NA	
Ascorbic acid		NA	NA	NA	NA
Asphalt		NA	LA/D		
Aspirin®		NA		NA	
ASTM oil no.1		NA	LA	NA	
ASTM oil no. 2		NA	LA	NA	
ASTM oil no. 3		LA	EA	LA	
Atabrine®		NA		NA	
Atropine		NA		NA	
Atropine salts		NA		NA	
Automotive oil				EA	
Barium hydroxide, aq.	all	NA	NA	NA	NA
Barium salts	see introduction				
Barium sulphide		NA	NA	NA	NA
Battery acid		NA	NA	NA	NA
Beater glue(anlmal glue)	commercial	NA	NA	NA	NA
Beef fat		NA	N/LA	NA	EA
Beef tallow		NA	N/LA		
Beer		NA	NA	NA	NA
Beer colouring agents	commercial	NA		NA	
Beeswax		NA	N/LA	NA	
Benzaldehyde, aq.	all	NA	N/LA	EA	
Benzaldehyde	1% in isopropanol	NA	NA	NA	
Benzene*	tech pure	EA	EA	EA	
Benzene hexachloride		NA		NA	
Benzene-sulphonic acid		NA	NA	EA	
Benzoic acid, aq.	all	NA	NA	NA	NA
Benzoyl chloride		LA	LA	EA	
Benzyl acetate					EA
Benzyl alcohol*		NA	NA	EA	
Benzyl Chloride		LA	EA	EA	
Bicarbonate of soda		NA	NA	NA	NA
Bichromate-sulphuric acid	conc	NA	EA	LA	
Bicycle oil		NA		NA	
Bismuth salts	see introduction				
Bismuth trichloride				LA	
Bisulphite solution		NA		NA	
Bitumen		NA	LA/D	NA	EA
Black liquor		NA		NA	
Blankite		NA		NA	
Bleaching liquor	12.5% Chlorine	LA	EA	EA	
Bleaching powder		NA	NA		
Blue ashes		NA		NA	
Bone oil		NA	NA	LA	EA
Borax (sodium tetraborate) aq.		NA	NA	NA	NA

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Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Boric acid methyl ester		NA	L/EA		
Boric acid, aq.	all	NA	NA	NA	NA
Boron trifluoride		NA	EA	NA	EA
Brake fluid		LA	EA	EA	
Brandy		NA	NA	NA	
Brandy-wine		NA		NA	
Brass polish				LA	
Brilliantine				LA	
Brine	sat	NA	NA	NA	NA
Bromic acid	conc	EA		EA	
Bromic acid	10%	NA		NA	
Bromine	dry gas	EA		EA	
Bromine	liquid	EA		EA	
Bromine water	sat	NA		EA	
Bromobenzene				EA	
Bromochloromethane		EA		EA	
Bromophorm		EA		EA	
1,3-Butadiene, gaseous	tech	LA	EA		
Butane, gaseous		NA		NA	
Butanediol*, aq.	all	NA	NA	NA	NA
Butanetriol, aq.	all	NA	NA	NA	
Butanol, aq.	all	NA	NA	NA	NA
Butanone (Methyl Ethyl Ketone)		NA	LA/EA		
2-Butenediol-1,4	tech grade	NA			
Butoxyl® (methoxybutylacetate)		NA	LA	NA	
Butter*		NA		LA	
Butyl acetate		NA	LA	EA	LA
n-Butyl acetate*		NA	LA	LA	LA
Butyl acrylate		NA	LA	EA	
Butyl alcohol*	100%	NA	NA	NA	
n-Butylamine		LA		EA	
Butyl benzyl phthalate		NA	NA		
Butyl chloride		EA		EA	
Butyl phenol	tech grade	NA	NA	EA	
Butyl phenone	tech grade	LA			
Butyl phthalate (dibutyl phthalate)		NA	LA		
Butyl stearate					EA
Butylene glycol	tech pure	NA	NA	NA	
Butyraldehyde		NA	LA	EA	
Butyric acid, aq.	all	EA	EA	EA	
Cadmium salts	see introduction				
Cadmium sulphide		NA		NA	
Caffeine and its salts		NA		NA	
Calcium bisulphide		NA	NA	NA	NA

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Reagent	Concentration	LLDPE > 930kg/m^3		LDPE/LLDPE < 930kg/m^3	
		20°C	60°C	20°C	60°C
Calcium bisulphite		NA	NA	NA	NA
Calcium carbide		NA	NA	NA	NA
Calcium chloride	20% in methanol	NA			
Calcium hydroxide		NA	NA	NA	NA
Calcium hydrochlorite, aq.	all	NA	NA	NA	NA
Calcium oxide		NA	NA	NA	NA
Calcium salts	see introduction				
Calcium sulphide, aq.	<10%	LA	LA		
Californian mixture		NA		NA	
Calomel		NA		NA	
Camphor		EA		EA	
Camphor oil*		EA		EA	
Cane sugar aq.		NA	NA	NA	NA
Caprolactam		NA		N/LA	
Car polish		NA		N/LA	
Carbazole		NA	NA	NA	
Carbolic acid (phenol)		NA	NA/D	LA	EA
Carbolineum, aq.		NA/D	LA/D	L/EA	EA
Carbon black		NA		NA	
Carbon dioxide	all	NA	NA	NA	NA
Carbon disulphide		LA	EA	EA	
Carbonic acid	all	NA	NA	NA	NA
Carbonic acid, dry	100%	NA	NA	NA	NA
Carbon monoxide, gaseous		NA	NA	NA	NA
Carbon tetrachloride	tech grade	L/EA	EA	EA	
Carnauba wax				LA	
Casein		NA	NA		
Castor oil*	conc	NA	NA	EA	
Cattle feed		NA		NA	
Caustic potash		NA	NA	LA	
Caustic potash solution	50%	NA	NA	NA	
Caustic soda		NA	NA	NA	
Caustic soda solutions	all	NA	NA	NA	
Cellosolve®				LA	
Cellosolve acetate		EA		LA	
Cellulose varnish				L/EA	
Cetane				EA	
Cetyl alcohol (hexadecanol)*		NA	NA	EA	
Cheese		NA		NA	
Chloracetic acid				L/EA	
Chloral (trichloroacetaldehyde)		NA	NA		
Chloral hydrate, aq.		NA	NA/D	EA	
Chloramine, aq.	sat	NA			
Chloric acid, aq.	1%	NA	NA		
Chloric acid, aq.	10%	NA	NA		

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Reagent	Concentration	LLDPE > 930kg/m^3		LDPE/LLDPE < 930kg/m^3	
		20°C	60°C	20°C	60°C
Chlorinated lime		NA	NA		
Chlorine	100% dry gas	LA	EA	EA	
Chlorine dioxide	10% moist gas	LA		LA	
Chlorine	moist gas	LA	EA	LA	EA
Chlorine	liquid	EA		EA	
Chlorine bleach	12.5% Chlorine	LA	EA	EA	
Chloracetic acid aq.	all	NA	NA	EA	
Chloracetic acid	<85%	NA	NA	EA	
Chlorine water	sat sol	NA	LA	NA	EA
Chlorine water	2%	NA	NA	NA	NA
Chloroamine		NA		NA	
Chlorobenzene*		EA	EA	EA	
Chlorocarbonic acid		NA	LA		
Chloroethanol		NA	NA/D		
Chloroform*	tech grade	L/EA	EA	EA	
Chloroformic acid ester		NA	LA		
Chloromethyl bromide		EA		EA	
Chloronitrobenzene liquid				L/EA	
Chloronitrobenzene solid		NA		N/LA	
Chlorophenol		NA		N/LA	
Chloropicrin		N/LA	EA		
Chloropropionic acid				L/EA	
Chlorosulphonic acid	tech grade	EA		EA	
Chocolate syrup		NA		NA	
Chromate yellow		NA		NA	
Chrome alum		NA	NA	NA	NA
Chrome anode mud		NA	NA		
Chromic acid	plating sol	NA	NA	NA	NA
Chromic acid	up to 50%	EA			
Chromium salts	see introduction				
Chromium trioxide, aq	50%	LA	EA/D		
Chromosulphuric acid		EA	EA		
Cider*		NA	NA	NA	NA
Cinnamon		NA		NA	
Cinnamon oil				L/EA	
Citric acid*, aq	sat	NA	NA	L/NA	NA
Citrus juices		NA	NA	NA	NA
Clove oil				L/EA	
Cloves				L/EA	
Coal-tar oil		NA/D	LA/D	EA	
Cobalt salts	see introduction				
Coca Cola syrup		NA		NA	LA
Coconut fat		NA		N/LA	
Coconut oil		NA		N/LA	
Coconut oil fatty alcohol*	tech pure	LA	NA	NA	

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		20°C	60°C	20°C	60°C
Codliver oil		NA	LA	LA	EA
Coffee extract		NA	NA	NA	
Cognac		NA		NA	
Cola concentrates*		NA	NA	NA	
Colcother		NA		NA	
Colophonium (resin)		NA		NA	
Common salt	dry	NA	NA	NA	
Common salt, aq.	all	NA	NA	NA	NA
Copper cyanide	sat	NA		NA	NA
Copper green		NA		NA	
Copper oxide		NA		NA	
Copper oxychloride		NA		NA	
Copper salts	see introduction				
Corn oil*		NA	LA	LA	EA
Corn syrup		NA	NA		
Cottonseed oil*	tech grade	NA	NA	N/LA	
Coumarone resins		NA	NA		
Cream (face, hand)		NA		N/LA	
Creolin				L/EA	
Creosote		NA	NA/D	EA	
Cresol	100%	NA	LA/D	L/EA	
Cresol, aq.	dilute	NA	NA/D	N/LA	
Cresylic acids	crude			EA	
Crop protection agents	commercial	NA	NA	NA	
Crotonaldehyde	tech grade	NA	LA	EA	
Crude oils (minerals)		NA	LA	L/EA	
Cupric chloride		NA	NA	NA	NA
Cupric fluoride		NA	NA	NA	NA
Cupric nitrate		NA	NA	NA	NA
Cupric sulphate		NA	NA	NA	NA
Cuprous chloride	sat sol	NA		NA	
Cyanamide				L/EA	
Cyclanone	commercial	NA	NA	NA	NA
Cyclohexane		EA		EA	
Cyclohexanol		NA	NA	EA	
Cyclohexanone		NA	LA	EA	
Cyclohexylamine				EA	
1,2 dibromoethane				EA	
DDT (powder)		NA	LA	N/LA	EA
Decahydronaphthalene	tech pure	NA	LA	LA	EA
Decyl alcohol (decanol)				EA	
Defoamer		NA	N/LA		
Detergent (liquid)*		NA	NA	L/EA	
Detergent (powder)		NA		N/LA	
Detergents (synthetic)*		NA	NA	NA	NA

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Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Developer (photographic)		NA/D	NA/D	NA/D	NA/D
Dextrin	18%	NA	NA	NA	NA
Dextrose		NA	NA	NA	NA
Dextrose, aq.	any	NA	NA	NA	NA
1,2-diaminoethane	tech grade	NA	NA		
Diamyl ether				EA	
Diazo salts		NA	NA	NA	NA
1,2-dibromoethane		LA	EA		
Dibutyl amine		N/LA	EA	EA	
Dibutyl ether	tech	N/LA	EA	EA	
Dibutyl phthalate*	tech	NA	LA	LA	EA
Dibutyl sebacate		NA	LA	LA	LA
Dichloroacetic acid	tech	NA	LA/D	NA	
Dichloroacetic acid	50%	NA	NA	NA	
Dichloroacetic acid methyl ester		NA	NA	EA	
Dichlorobenzene*		EA		EA	
Dichlorobenzole				EA	
Dichloroethane		LA	LA	EA	
1.1-Dichloroethylene					
(vinylidene chloride)		EA			
Dichloromethane		NA		N/LA	
Dichloropropane		LA	EA	EA	
Dichloropropene		EA		EA	
Diesel oil		NA	LA	LA	
Diethanolamine	tech	NA			
Diethylamine		LA		LA	
Diethyl ether		N/LA	LA	EA	
Diethyl ketone*		LA	LA	L/EA	EA
Diethylene glycoether				L/EA	
Diethylene glycol*		NA	NA	NA	
Diglycolic acid*, aq.	30%	NA	NA	NA	NA
Dihydronaphthalene				EA	
Diisobutyl ketone	tech pure	NA	L/EA	EA	
Diisobutylene				EA	
Diisooctyl phthalate (DIOP)	tech grade	NA	L A		
Diisopropyl ether		N/LA	EA	EA	
Diisopropyl ketone				EA	
Dimethylamine		EA		EA	
Dimethyl carbinol		NA		NA	
Dimethyl formamide	tech grade	NA	N/LA	LA	EA
Dimethyl sulphoxide		NA	NA		
Dinonyl phthalate (DNP)	tech grade	NA	LA		
Dioctyl phthalate (DOP)		NA	LA	LA	EA
Dioxane		NA	NA	LA	EA
Dipentane		EA		EA	

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Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Diphenylamine		NA	LA	N/LA	
Diphenyl ether		NA		N/LA	
Diphenyl oxide		NA	LA	N/LA	
Disinfectant (Eucalyptus)				EA	
Disinfectant (Pine)				EA	
Disodium phosphate		NA	NA	NA	NA
Disodium sulphate		NA	NA	NA	NA
Di(2-ethylhexyl) phthalate (DOP)		NA	LA	LA	EA
Di-n-Butylamine		N/LA	EA	EA	
Di-n-Butyl ether		N/LA	EA	EA	
Dodecanol		NA	NA	NA	NA
Dodecylbenzenesulphonic acid		NA	LA	NA	
Dolomite		NA		NA	
Drano®		NA	NA	NA	NA
Drinking water		NA	NA	NA	NA
Dyes		NA/D	NA/D	NA/D	
n-Decane				EA	
Eau de Cologne				LA	
Eau de Javelle		N/LA	EA	EA	
Eau de Labarraque		N/LA		EA	
Eggs		NA		NA	
Electrolytic plating solutions		N/LA	LA		
Emetic tartar		NA		NA	
Emulsifiers	all	NA	NA	NA	NA
Emulsions*	photographic	NA	NA	NA	
Emulsion paint		NA		NA	
Engine oil		NA		NA	
Ephetin®, aq.	10%	NA	NA		
Epichlorhydrin		NA	NA		
Epsom salts	all	NA	NA	NA	NA
Essential oils		EA		EA	
Esters, aliphatic	tech pure	NA	N/LA	LA	EA
Ethane		NA	NA		
Ethanol*	96%	NA	NA	N/LA	EA
Ethanolamine (2-aminoethanol)		NA			
Ether		N/LA	LA	EA	
Ethereal oils		LA	EA		
Etheric oil				LA	
Ethyl acetate	tech pure	LA	EA	LA	EA
Ethyl acrylate		LA	EA	EA	
Ethyl alcohol*, aq.	40%	NA	NA	NA	EA
Ethyl alcohol*	96%	NA	NA	EA	
Ethyl alcohol/acetic acid		NA	NA	NA	
Ethyl benzene*	tech grade	EA		EA	
Ethyl butyrate				LA	EA

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Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Ethyl chloride	tech grade	EA		EA	
Ethyl ether	tech pure	EA		EA	
Ethyl formate				EA	
Ethyl lactate				LA	EA
Ethyl succinate					EA
Ethylene		NA	NA		
Ethylene bromide				EA	
Ethylene chlorohydrin	tech grade	NA	NA/D	EA	
Ethylene chloride*		EA		EA	
Ethylenediamine	tech pure	NA	NA	NA	
Ethylenediamine tetraacetic acid		NA	NA	NA	
Ethylene dibromide		LA	EA	EA	
Ethylene dichloride		LA	EA	EA	
Ethylene monochloride				EA	
Ethylene glycol*		NA	NA	N/LA	N/LA
Ethylene glycol monobutyl ether		NA		LA	LA
Ethylene oxide, gaseous	tech pure	NA	NA	EA	
Ethylene salicylate				LA	
2-Ethylhexanol		NA	LA	NA	
Ethylcarbinol				LA	
Eugenol				EA	
Fabric conditioner		NA		NA	
Fatty acid amides		NA	LA	NA	
Fatty acids	(>C6)	NA	N/LA	NA	EA
Fatty alcohols		NA	LA		
Ferric alum, aq.	sat	NA	NA		
Ferric ammonium sulphate	sat	NA	NA		
Ferric chloride	sat	NA	NA	NA	NA
Ferric nitrate	sat	NA	NA	NA	NA
Ferric salts		NA	NA	NA	NA
Ferric sulphate		NA	NA	NA	NA
Ferrous ammonium citrate		NA	NA	NA	NA
Ferrous chloride	sat	NA	NA	NA	NA
Ferrous salts		NA	NA	NA	NA
Ferrous sulphate		NA	NA	NA	NA
Fertilizer salts, aq.		NA	NA	NA	NA
Firneedle oil				EA	
Firwood oil		NA	LA	EA	
Fish oil		NA		N/LA	
Fish solubles*		NA	NA	NA	NA
Fixing salt, aq.		NA	NA		
Fixing solution	photographic	NA		NA	
Floor wax				L/EA	
Fluoroboric acid, aq.		NA	LA	NA	
Fluorine, gaseous		EA		EA	

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Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Fluosilicic acid	32%	NA	NA	NA	NA
Fluosilicic acid	conc	NA		EA	
Formaldehyde	up to 40%	NA	NA	NA	NA
Formamide		NA	NA	N/LA	
Formic acid	10%	NA	NA	NA	NA
Formic acid	85%	NA	NA	NA	NA
Formic acid	100.00%	NA	NA	NA	NA
Freon 11®		NA		LA	
Freon 12®		LA	EA	LA	
Freon 13B1®		NA		NA	
Freon 21®		NA		LA	
Freon 22®		NA		NA	
Freon 32®		NA		NA	
Freon 113®		NA		LA	
Freon 115®		NA		NA	
Frigen 12®		LA	EA	LA	
Fructose		NA	NA	NA	NA
Fruit juice	unfermented	NA	NA	NA	NA
Fruit juice	fermented	NA	NA	NA	NA
Fruit pulp*		NA	NA	NA	NA
Fuel oil		NA	LA	LA	EA
Fuming sulphuric acid		EA			
Fungicides		NA	LA	NA	
Furfural		EA		EA	
Furfuryl alcohol*		EA		EA	
Gallic acid*	sat sol	NA	NA	NA	NA
Galvanizing liquor		NA		NA	
Gas, natural		NA			
Gas liquor; ammoniacal		NA	NA	NA	NA
Gasoline*		LA	IA	LA	EA
Gelatin		NA	NA	NA	NA
Genantin*		NA	NA	NA	
Gin		NA		NA	NA
Glacial acetic acid	tech pure	NA	LA/D	LA	EA
Glauber salt, aq.	all	NA	NA	NA	NA
Glucose, aq.	all	NA	NA	NA	NA
Glue		NA	NA	NA	NA
Glue (fish)		NA		NA	
Glue (bone)		NA		NA	
Glycerin*, aq.	up to 100%	NA	NA	NA	NA
Glycerol		NA	NA	NA	NA
Glycerol dichlorohydrin		NA	NA	NA	NA
Glycine (aminoacetic acid)		NA	NA		
Glycol*, aq.	commercial	NA	NA	NA	NA
Glycolic acid*	30%	NA	NA	NA	NA

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Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Glycolic acid, aq*.	<70%	NA	NA	LA	
Glycolic acid butyl ester		NA	NA	LA	
Glysantin®		NA	NA	NA	NA
Grape juice		NA		NA	
Grape sugar		NA	NA	NA	NA
Grape syrup		NA		NA	
Grease paint		NA		NA	
Grisiron® 8302		LA	LA	EA	
Grisiron® 8702		NA	NA		
Gypsum		NA		NA	
Hair snampoo		NA		NA	EA
Hair tonic				EA	
Halothan®		LA	L/EA	EA	
Hand cream		NA		NA	EA
Heavy spar		NA		NA	
Heptane*		EA		EA	
Hexachlorocyclohexane		NA		N/LA	EA
Hexachlorophene (in Potassium iodide)		LA	LA	EA	
Hexadecanol		NA	NA	EA	
Hexafluosilicic acid	40%	NA	NA		
Hexane		NA	LA	EA	
Hexanetriol, aq.	all	NA	NA	NA	NA
Hexanol*	100%	NA	NA	NA	NA
Hexyl alcohol, aq.	10%	NA		NA	EA
Honey	22%	NA	NA	NA	EA
Hydraulic fluid		NA	LA		
Hydrazine hydrate		NA	NA	NA	
Hydrobromic acid, aq.	50%	NA	NA	NA	NA
Hydrobromic acid	100%	NA	NA	NA	NA
Hydrochloric acid	any	NA	NA	NA	NA
Hydrocyanic acid	sat sot	NA	NA	N/LA	LA
Hydrocyanic acid	10%	NA	NA	NA	NA
Hydrofluoric acid, aq.	4%	NA	NA	NA	NA
Hydrofluoric acid	40-85%	NA	LA	NA	LA
Hydrofluosilicic acid, aq	all	NA	NA	NA	
Hydrogen	100%	NA	NA	NA	NA
Hydrogen bromide, gaseous, dry		NA	NA	NA	NA
Hydrogen chloride (drygas/anhydrous)		NA	NA	NA	NA
Hydrogen fluoride	anhydrous	NA	NA	NA	NA
Hydrogen peroxide	sol	NA	NA	N/LA	NA
Hydrogen peroxide	upto 12%	NA	EA	NA	NA
Hydrogen peroxide	>30%	NA	EA	NA	EA
Hydrogen phosphide	100%	NA	NA	NA	NA
Hydrogen sulphide, dry gas		NA	NA	NA	NA
Hydrogen sulphide, aq.	sat	NA	NA		

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Reagent	Concentration	LLDPE > 930kg/m^3		LDPE/LLDPE < 930kg/m^3	
		20°C	60°C	20°C	60°C
Hydroquinone		NA/D	NA/D	NA/D	NA/D
Hydrosulphite, aq.	up to 12%	NA	NA	NA	NA
Hydroxylamine sulphate aq.	12%	NA	NA		
Hypochlorous acid	conc	NA	LA	LA	EA
Hyposulphite, aq.	to 10%	NA	NA		
Ice cream				LA	
Ink*	printing	NA	N/L.A	LA	
Ink*	writing	NA		NA	NA
Insecticide, aq. dispersion				LA	
Insecticide, oil solution				EA	
Insecticide, powder				LA	
Iodine (3% in potassium iodide)		LA	EA	EA	
Iodine tincture		NA	EA	EA	
Iron salts	see introduction				
Isoamyl alcohol	tech	NA	LA		
Isobutyl alcohol (isobutanol)*		NA	NA	LA	
Isobutyric acid	tech grade	NA	LA		
Isooctane		NA	LA	LA	
Isophorone				EA	
Isopropyl acetate		NA	LA	EA	
Isopropyl alcohol (isopropanol)*		NA	NA	NA	
Isopropyl ether	tech grade	N/LA	EA	EA	
Jams and jellies		NA	NA	NA	NA
Kerosene		LA	EA	LA	EA
Kerosine		LA	EA	LA	EA
Ketchup		NA		NA	
Ketones		N/LA	L/EA	N/LA	EA
Labarraque's solution		N/LA		EA	
Lactic acid, aq.	10-96%	NA	NA	NA	NA
Lactose (milk sugar)		NA	NA	NA	NA
Lanolin (wool fat)		NA	NA	NA	LA
Lard		NA	NA	NA	
Latex		NA	NA	NA	NA
Lauryl alcohol*		NA	NA	NA	NA
Lauryl chloride				EA	
Lauryl sulphate				EA	
Lead oxide		NA		NA	
Lead salts	see introduction				
Lead tetra-ethyl		NA		NA	EA
Lemon oil				LA	
Lemon syrup		NA		NA	
Lime		NA	NA	NA	NA
Lime milk				LA	
Lime salts		NA		NA	
Lime water		NA	NA	NA	

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Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Lindale powder				LA	
Linseed oil	tech pure	NA	NA	LA	EA
Liqueur		N/LA	EA	NA	NA
Liquid manure		NA	NA	NA	
Liquid paraffin		NA	NA	NA	LA
Liquid soaps		NA	NA	NA	NA
Lithium salts	see introduction				
Liver of sulphur				LA	
Lotion (hair, shaving)				LA	
Lubricating oil	tech grade	NA	N/LA	EA	
Lysol®		NA	LA	LA	EA
Machine oil		NA	LA	LA	EA
Magnesia				LA	
Magnesium fluosilicate		NA	NA	NA	NA
Magnesium hydroxide		NA	NA	NA	NA
Magnesium oxide				LA	
Magnesium salts	see introduction				
Maleic acid	up to 100%	NA	NA	NA	NA
Malic acid	50%	NA	NA	NA	
Manganese salts	see introduction				
Margarine		NA	NA	LA	EA
Mash		NA	NA	NA	
Mayonnaise		NA		LA	LA
Menthol		NA	LA	LA	EA
Mercapto-acetic acid				LA	
Mercuric cyanide		NA	NA	NA	NA
Mercurochrome		NA		NA	
Mercury		NA	NA	NA	NA
Mercury oxide		NA		NA	
Mercury salts	see introduction				
Mercury soaps		NA	NA	NA	NA
Mesityl oxide		NA		NA	EA
Metallic mordants		NA		NA	
Metal soaps	soluble	NA	NA	NA	NA
Methacrylate		NA	NA		
Methacrylic acid		NA	NA		
Methylallyl chloride				EA	
Methane				EA	
Methanol*		NA	NA	NA	LA
Methoxy butanol		NA	LA		
Methoxybutyl acetate		NA	LA	EA	
Methyl acetate	tech grade	NA		EA	
Methyl acrylate	tech grade	NA	NA	EA	
Methyl alcohol*	100%	NA	NA	NA	LA
Methylamine, aq	32%	NA		NA	

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Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Methyl benzene		LA	EA	EA	
Methyl benzoic acid (toluyl acid)		LA		EA	
Methyl bromide, gaseous		EA		EA	
2-Methylbutanol-2	tech grade	NA	LA		
Methyl chloride*, gaseous		LA	EA	EA	
Methyl cyclohexane		LA	L/EA	EA	
Methyl ethyl ketone		NA	L/EA	LA	EA
Methyl formate				EA	
Methyl glycol		NA	NA	NA	EA
Methyl isobutyl ketone		NA	L/EA	EA	
Methyl methacrylate		NA	NA		
4-Methyl pentanol-2		NA	N/LA/D		
Methyl propyl ketone		NA	LA	LA	
n-Methyl pyrrolidone		NA	NA		
Methyl salicylate		NA	LA	EA	
Methyl sulphate	50%	NA	NA	LA	
Methyl sulphuric acid	50% aq.	NA	NA	NA	NA
Methylated spirits				LA	EA
Methylene chloride		EA		EA	
Milk		NA	NA	NA	NA
Mineral oils		NA	LA	LA	EA
Mineral spirits		N/LA	LA	EA	
Mineral water		NA	NA	NA	
Minerals		NA		NA	
Molasses		NA	NA	NA	NA
Molasses wort		NA	NA	NA	
Molybdenum salts	see introduction				
Monochloracetic acid		NA	NA	EA	
Monochloracetic acid ethyl ester		NA	NA	EA	
Monochloracetic acid methyl ester		NA	NA	EA	
Monochlorobenzene		LA	EA	EA	
Mordants, metallic		NA			
Morpholine		NA	NA		
Motor oil (HD oil)		NA	N/LA	LA	
Mustard		NA	NA	NA	
Must		NA	NA		
Nail varnish				EA	
Nail varnish remover		NA	LA	EA	
Naphtha*		LA	EA	EA	
Naphtha/benzene mixture 80/20		NA	LA		
Naphthalene*		LA	EA	EA	
Naphthol				EA	
Nickel salts	see introduction				
Nicotine*	<10%	NA	NA	NA	NA
Nicotinic acid	any	NA		NA	NA

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Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Nitric acid	0 - 25%	NA	NA	NA	NA
Nitric acid	50%	NA	LA	NA	LA
Nitric acid	70%	LA	EA	LA	EA
Nitric acid	95 - 98%	EA		EA	
Nitric acid	fuming			EA	
Nitrobenzene*		EA		EA	
Nitrocellulose		NA		NA	
Nitrocresol				LA	
Nitroethane		NA		NA	
Nitroglycerine				LA	
Nitromethane		NA		NA	
Nitrosyl chloride				EA	
O-Nitrotoluene		EA		EA	
Nitrous acid				EA	EA
Nonanol (nonyl alcohol)*		NA	NA	NA	LA
Nut oil		NA		NA	
Nutmeg		NA		NA	
Nutmeg oil				LA	
Ochre		NA		NA	
n-Octane		NA	NA	NA	NA
Octanol (Octyl alcohol)*		NA	EA	LA	EA
Octyl cresol		LA	EA	EA	
Oil of cloves				EA	
Oil, ethereal		LA	EA	EA	
Oil of eucalyptus				EA	
Oil of mustard				EA	
Oil of myrrh				EA	
Oil of wintergreen					
Oils, animal & vegetable		NA	N/LA	L/EA	EA
Oils, essential		LA	EA	EA	
Oleic acid		NA	LA	EA	
Oleum		EA		EA	
Olive oil		NA	EA	LA	EA
Optical brighteners		NA	NA	NA	
Orange extract		NA		NA	
Orange juice		NA	NA	NA	NA
Orange syrup		NA		NA	
Oxalic acid*, aq.		NA	NA	NA	NA
Oxygen	all conc	NA	NA	NA	NA
Ozone	50 ppm	LA	EA	LA	EA
Paper mill liquors		NA		NA	
Palmitic acid		NA	NA	NA	EA
Palmityl alcohol		NA	NA	NA	NA
Palm kernel oil		NA	NA	LA	
Palm nut oil		NA		LA	

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Reagent	Concentration	LLDPE > 930kg/m^3		LDPE/LLDPE < 930kg/m^3	
		20°C	60°C	20°C	60°C
Paraffin	liquid	NA	NA	LA	EA
Paraffin	emulsions	NA	LA	LA	EA
Paraformaldehyde		NA	NA	NA	NA
Peanut oil	tech grade	NA			
Pentane				EA	
Pentanol		NA		NA	NA
Peppermint oil		NA		EA	
Perchlorethylene		EA		EA	
Perchloric acid, aq.	20%	NA	NA	NA	NA
Perchloric acid, aq.	50%	NA	LA		
Perchloric acid, aq.	70%	NA	EA		
Perfume oils		LA	L/EA	EA	
Petrol		NA	N/LA	L/EA	EA
Petroleum		NA	LA	EA	
Petroleum ether		NA	LA	EA	
Petrol/benzene mixture	80/20			EA	
Phenol		NA	NA/D	EA	
Phenolic resin moulding materials		NA	NA	NA	
Phenylcarbinol				EA	EA
Phenyl ethyl alcohol		NA	NA		
Phenyl hydrazine	tech grade	LA	L/EA		
Phenyl hydrazine hydrochloride		NA	EA		
Phenylsulphonate		NA	NA	NA	
Phosgene, gaseous		LA		N/LA	EA
Phosgene, liquid	100%	EA		EA	
Phosphates, aq.	all	NA	NA	NA	NA
Phosphoric acid, aq.	25%	NA	NA	NA	NA
Phosphoric acid	50%	NA	NA	NA	NA
Phosphoric acid	80-90%	NA	LA/D	NA	LA
Phosphoric acid	95%	NA	LA/D	LA	EA
Phosphoric acid, gas		NA		NA	EA
Phosphoric anhydride		NA		NA	NA
Phosphorous oxychloride		NA	LA	EA	
Phosphorus, yellow	100%	NA		NA	
Phosphorus pentoxide		NA	NA	NA	NA
Phosphorus trichloride		NA	LA	NA	NA
Photographic developers		NA/D	NA/D	NA/D	NA/D
Photographic emulsions		NA		NA	
Photographic fixing solutions		NA	NA	NA	NA
Photographic solutions		NA		NA	
Phthalic acid, aq.	50%	NA	NA	NA	
Phthalic acid dibutyl ester		NA	LA	LA	LA
Phthalic acid ester		NA	N/LA	NA	LA
Phthalic anhydride		NA	NA	NA	NA
Pickling baths		NA		NA	

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Reagent	Concentration	LLDPE > 930kg/m^3		LDPE/LLDPE < 930kg/m^3	
		20°C	60°C	20°C	60°C
Picric acid	10% in alcohol	NA		NA	
Picric acid, aq.	1%	NA		NA	
Pine oil				EA	
Pineapple juice		NA	NA	NA	NA
Pine needle oil		NA	LA	EA	
Plant protection agents, aq.		NA	NA		
Plasticisers		NA	LA		
Plating solutions*brass		NA	NA	NA	NA
cadmuim		NA	NA	NA	NA
chromium				EA	
copper		NA	NA	NA	NA
gold		NA	NA	NA	NA
indium		NA		NA	
lead		NA	NA	NA	NA
nickel		NA	NA	NA	NA
rhodium		NA		NA	
silver		NA	NA	NA	NA
tin		NA	NA	NA	NA
zinc		NA	NA	NA	NA
Plumbing cleaner		NA		NA	
Polyacrylic acid emulsions		NA	NA		
Polyester plasticisers		NA	N/LA		
Polyester resins		LA	EA		
Polyglycols		NA	NA	NA	
Polysolvan O®		NA	NA	EA	
Potash alum, aq.	all	NA	NA	NA	NA
Potassium acid sulphate		NA	NA	NA	NA
Potassium antimonate		NA	NA	NA	NA
Potassium aluminium sulphate	any	NA	NA		
Potassium bicarbonate, aq.	all	NA	NA	NA	NA
Potassium bichromate		NA	NA	NA	NA
Potassium bisulphate, aq.	all	NA	NA	NA	NA
Potassium bisulphite		NA	NA	NA	NA
Potassium chromic sulphate		NA	NA		
Potassium cuprocyanide		NA	NA	NA	NA
Potassium cyanide, aq.	all	NA	NA	NA	NA
Potassium hexacyanoferrate	all	NA	NA		
Potassium hydrogen carbonate		NA	NA		
Potassium hydrogen sulphate		NA	NA		
Potassium hydrogen sulphide		NA	NA		
Potassium hydroxide	up to 30%	NA	NA	NA	NA
Potassium hydroxide	conc	NA	NA	NA	NA
Potassium hypochlorite	NA	NA	NA	NA	NA
Potassium perchlorate,aq.	1%	NA			
Potassium perchlorate,aq.	to 10%	NA	LA	NA	NA

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Reagent	Concentration	LLDPE > 930kg/m^3		LDPE/LLDPE < 930kg/m^3	
		20°C	60°C	20°C	60°C
Potassium permanganate		NA	NA	NA	NA
Potassium permanganate	to 6%	NA	NA/D	NA	NA/D
Potassium permanganate	20%	NA	NA/D	NA	NA/D
Potassium salts	see introduction				
Potassium sulphide		NA	NA	NA	NA
Potassium tetracyanocuprate	sat	NA	NA	NA	NA
Potato chips		NA		NA	
Propargyl alcohol*, aq.	7%	NA	NA	NA	
Propionic acid, aq.	all	NA	NA	NA	
n-Propyl alcohol (n-propanol)*		NA	NA	NA	NA
n-Propyl alcohol (l-propanol)*		NA	NA	NA	NA
Propylene dichloride*	100%	EA		EA	
Propylene glycol*		NA	NA	NA	NA
Propylene oxide		NA	NA	EA	EA
Prussic acid				LA	
Prussian blue		NA		NA	
Pseudocumene		LA	LA	EA	
Pyridine*		NA	LA	NA	
Quinine		NA	NA	NA	
Quinine salts		NA		NA	
Ratbane		NA		NA	
Rayon coagulating bath		NA		NA	
Red lead		NA		NA	
Red Qchre		NA		NA	
Release agents		NA	NA		
Resorcine		NA		NA	
Resorcinol	sat	NA	NA	NA	NA
Ricinus oil				EA	
Rubber dispersions (Latex)		NA	NA	NA	NA
Rum		NA		NA	
Saccharose		NA	NA	NA	NA
Salad oil		NA		NA	
Salad sauce				LA	
Salicyl aldehyde				LA	
Salicylic acid		NA	NA	NA	NA
Salt brines	sat	NA	NA	NA	
Salmiac		NA		NA	
Saltpetre		NA		NA	
Saponin		NA		NA	
Saturated steam condensate		NA	NA	NA	NA
Sauerkraut		NA	NA	NA	NA
Scouring powder		NA		NA	
Sea water		NA	NA	NA	NA
Selenic acid		NA	NA	NA	NA
Sesame oil		NA		NA	

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Reagent	Concentration	LLDPE > 930kg/m³		LDPE/LLDPE < 930kg/m³	
		20°C	60°C	20°C	60°C
Shampoo		NA		NA	
Shortening*		NA	NA	NA	NA
Silicic acid, aq.	all	NA	NA	NA	NA
Silicone emulsion		LA	EA	LA	EA
Silicone oil	tech pure	LA	EA	LA	EA
Silver cyanide		NA	NA	NA	NA
Silver polish		NA		NA	
Silver salts	see introduction				
Soap (soft, green, yellow)		NA		NA	
Soap solutions*	any	NA	NA	NA	NA
Soda, aq.	all	NA	NA	NA	NA
Sodium acid sulphate		NA	NA	NA	NA
Sodium aluminate		NA	NA	NA	NA
Sodium aluminium sulphate		NA	NA	NA	NA
Sodium antimonate		NA	NA	NA	NA
Sodium bicarbonate. aq.	sat	NA	NA	NA	NA
Sodium bisulphate, aq.	sat	NA	NA	NA	NA
Sodium bisulphite, aq.	sat	NA	NA	NA	NA
Sodium chlorite, aq.	50%	NA		NA	
Sodium cyanide		NA	NA	NA	NA
Sodium dodecylbenzenesulphonate		NA	NA	NA	
Sodium hexacyanoferrate (III)		NA	NA	NA	NA
Sodium hexacyanoferrate (II)		NA	NA	NA	NA
Sodium hexametaphosphate	sat	NA			
Sodium hydrogen carbonate, aq.		NA	NA		
Sodium hydrogen sulphite	sat	NA	NA		
Sodium hydroxide	solid	NA	NA	NA	NA
Sodium hydroxide, aq.	all	NA	NA	NA	NA
Sodium hypersulphate		NA	NA	NA	NA
Sodium hypochlorite	12.5% Chlorine	LA	EA	LA	
Sodium perborate		NA	LA	NA	EA
Sodium perchlorate		NA	NA	NA	
Sodium peroxide, aq.	10%	NA	NA	NA	NA
Sodium peroxide	sat	LA		EA	
Sodium salts	see introduction				
Sodium sulphide	sat	NA	NA	NA	NA
Sodium tetraborate	sat	NA	NA	NA	NA
Soft soap		NA	NA	NA	NA
Soldering fluid		NA		NA	
Solvent naphtha		NA		NA	
Soya oil		NA		NA	
Soyabean oil		NA	NA	LA	
Spermaceti		NA	LA	LA	EA
Spindle oil		N/LA	LA	EA	
Spirits		NA	NA	NA	

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		20°C	60°C	20°C	60°C
Stain remover		N/LA	LA	EA	
Standard mineral spirit		NA	LA	LA	EA
Starch, aq.*	any	NA	NA	NA	NA
Starch gum (dextrin)	18%	NA	NA	NA	NA
Starch syrup		NA	NA	NA	NA
Stearic acid*		NA	LA	NA	NA
Strontium salts	see introduction				
Styrene (styrol)		LA	EA	EA	
Sublimate		NA		NA	
Succinic acid, aq.	50%	NA	NA	NA	NA
Sucrose		NA	NA	NA	NA
Sugar		NA		NA	
Sugar beet juice		NA	NA	NA	NA
Sugar syrup		NA	NA	NA	NA
Sulphate of ammonia		NA		NA	
Sulphates, aq.	all	NA	NA	NA	NA
Sulphite liquor		NA		NA	
Sulphonic acid				NA	NA
Sulphur		NA	NA	NA	NA
Sulphur chloride		EA		EA	
Sulphur dioxide, aq.	all	NA	NA	NA	
Sulphur dioxide	dry	NA	NA	NA	NA
Sulphur dioxide	moist	NA		NA	EA
Sulphur trioxide		EA		EA	
Sulphuric acid	up to 50%	NA	NA	NA	NA
Sulphuric acid	60%	NA	NA	NA	NA
Sulphuric acid	70%	NA	LA	NA	LA
Sulphuric acid	80%	NA	EA	LA	EA
Sulphuric acid	95%	LA	EA	LA	EA
Sulphuric acid	98%	LA	EA	LA	EA
Sulnhuric acid	fuming	EA		EA	
Sulphuric ether		N/LA	LA	EA	
Sulphurous acid	10%	NA	NA	NA	
Sulphurous acid	30%	NA	NA	NA	NA
Sulphuryl chloride		EA		EA	
Superphosphate		NA		NA	
Surface active agents	normal	NA	NA	NA	NA
Synthetic detergents	all	NA	NA	NA	NA
Syrup		NA	NA	NA	NA
Tallow	tech grade	NA	NA	NA	EA
Tannic acid (tannin)	10%	NA	NA	NA	NA
Tanning extracts	vegetable	NA		NA	NA
Tartaric acid, aq.	all	NA	NA	NA	NA
Tea		NA		NA	
Tetrabromoethane		L/EA	EA	EA	

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		20°C	60°C	20°C	60°C
Tetrachloroethane		L/EA	EA	EA	
Tetrachloroethylene		L/EA	EA	EA	
Tetrachloromethane		L/EA	EA	EA	
Tetrahydrofuran*		EA		EA	
Tetrahydronaphthalene		LA	EA	EA	
Tetralin®		NA	EA	EA	
Tetraethyl lead		NA		NA	EA
Thallium salts	see introduction				
Thioglycolic acid		NA	NA		
Thionyl chloride		EA		EA	
Thiophene		LA	EA	EA	
Tin salts	see introduction				
Tincture of iodine		NA	LA/D	LA	EA
Titanium tetrachloride*	sat	EA		EA	
Titanium trichloride				EA	
Toluene*		EA		EA	
Toluic acids (methyl benzoic acids)	sat	LA			
Tomato juice & sauce		NA	NA	NA	NA
Transformer oil		NA	LA	LA	EA
Tributyl phosphate		NA	NA		
Trichloroacetaldehyde (chloral)		NA	NA		
Trichloroacetic acid	tech	NA	L/EA		
Trichloroacetic acid, aq.	50%	NA	NA		
Trichlorobenzene		EA		EA	
Trichloroethane				EA	
Trichloroethylene		EA		EA	
Tricresyl phosphate		NA	NA	EA	
Triethanolamine		NA	NA/D	LA	EA
Triethanolamine, aq.	sat	NA	LA	LA	EA
Triethanolamine oleate				LA	EA
Triethylene glycol*		NA	NA	NA	
Trimethyl borate		NA	L/EA		
Trimethylol propane, aq.		NA	NA		
Trimethylpropane		NA	NA	NA	NA
Trioctyl phosphate		NA	LA	EA	
Trisodium phosphate		NA	NA	NA	NA
Tritolyl phosphate				EA	
Tri-ß-chloroethylphosphate		NA	NA		
Turpentine	tech grade	EA		EA	
Two stroke oil		NA	LA	LA	EA
Urea, aq.	up to 30%	NA	NA	NA	NA
Uric acid		NA	NA	NA	NA
Urine		NA	NA	NA	NA
Varnish				LA	
Vanilla extract*		NA	NA	NA	NA

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		20°C	60°C	20°C	60°C
Vaseline®	tech pure	N/LA	LA	LA	EA
Vaseline oil	tech pure	N/LA	LA	LA	EA
Vegetable oils				LA	EA
Vinegar		NA	NA	NA	NA
Vinyl acetate		NA	NA	EA	
Vinyl chloride				LA	
Vinyl trichloride				EA	
Vinylidene chloride	tech grade	EA		LA	
Viscose spinning solutions		NA	NA	NA	
Vitamin C		NA	NA	NA	
Vitamin preparations	dry powders	NA	NA	NA	NA
Walnut oil		NA	LA	LA	EA
Washing up liquids		NA	NA	NA	NA
Waste gases, containing					
carbonic acid	all	NA	NA		
carbon monoxide		NA	NA		
hydrochloric acid	all	NA	NA		
hydrogen fluoride	traces	NA	NA		
nitrosyl H_2So_4	traces	NA	NA		
sulphur dioxide	low	NA	NA		
moist H_2So_4	all	NA	NA		
Water		NA	NA	NA	NA
Water	distilled	NA	NA	NA	NA
Waterglass				LA	
Wax alcohols	tech pure	LA	LA	EA	
Waxes		NA	N/LA	NA	
Wetting agents*	norm dil	NA	NA	NA	NA
Whey		NA	NA	NA	
Whisky*			NA		NA
White lead		NA		NA	
White spirit	tech pure	N/LA	LA	EA	
Wine		NA		NA	
Wine vinegar		NA	NA	NA	NA
Wood stains	end use conc	NA	N/LA	NA	NA
Worcestershire sauce				EA	
Xylene*			EA		EA
Xylenol				EA	
Yeast		NA	NA	NA	
Zinc ammonium carbonate		NA	NA	NA	NA
Zinc oxide		NA	NA	NA	NA
Zinc salts	see introduction				
Zinc sludge		NA	NA	NA	NA
Zinc stearate		NA	NA	NA	NA

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