

Chemical Resistance of Polyethylenes

Explanation

Symbol	Meaning	Notes
++	Good	The product has no effect
+	Fair	Less suitable grades and unfavourable conditions give rise to difficulties
o	Doubtful	Application of PE as packaging material (bottles) involves hazards which can be disregarded in some special cases only
-		Is not recommended for packaging applications
V	Unsuitable	The product produces inflammable, toxic or unpleasant-smelling vapours
CO ₂		Permeable to carbon dioxide
O ₂		Permeable to oxygen

It is recommended to use a low melt index grade to avoid the formation of internal and external stresses in order to minimize the hazard of environmental stress cracking if a "+" or "o" sign is indicated under 'physical attack'.

It is recommended to use a high density grade if a "+" or "o" sign is indicated under 'permeability'.

It is definitely inadvisable to use polyethylene as packaging material if a "-" sign is indicated!

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
A						
Acetaldehyde	++	++	o	o	-	V
Acetanilide	++	++	++	++	++	
Acetic acid 5%	++	++	+	++	++	
Acetic acid 50%	++	++	+	+	+	V
Acetic anhydride	++	++	o	o	o	V
Acetone	++	++	o	o	-	V [®]
Acetophenone	++	++	+	o	-	V
Acetylsalicylic acid	++	++	++	++	++	
Acrylonitrile	++	++	+	o	-	V
Adipic acid	++	++	+	+	+	
Alcohol	++	++	o	+	+	
Allylcohol	++	++	+	o	o	V
Alum (all types)	++	++	++	++	++	
Aluminium oxide	++	++	++	++	++	
Aluminium salts						See page 24
Amino acids	++	++	++	++	++	
Ammonia	++	++	++	++	++	CO ₂
Ammonium salts						See page 24
Ammonium-nitrate lime	++	++	++	++	++	
Amylacetate	++	++	o	o	-	V
Amylalcohol	++	++	+	+	+	V
Aniline	++	++	o	o	o	V

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Aniline dyes dry, -oil-soluble	++	++	+	+	+	
Aniline dyes dry, -water-soluble	++	++	++	+	+	
Aniline salts	++	++	+	+	+	
Aniseed oil	++	++	+	-	-	V
Anisole	++	++	o	o	-	V
Anthraquinone	++	++	+	++	++	®
Antifreeze	++	++	+	++	++	
Antimony	++	++	++	++	++	
Antimony compounds						See page 24
Aqua regia	-	-	o	++	++	not recommended
Arsenic	++	++	++	++	++	
Arsenic trioxide	++	++	++	++	++	
Aspirin	++	++	++	++	++	
Atropine and its salts	++	++	++	++	++	
B						
Barium hydroxide	++	++	+	++	++	CO2
Barium salts						See page 24
Barium sulphide	++	++	++	+	++	
Battery acid	++	++	++	++	++	
Beer	++	++	++	+	+	CO2 (pressure)
Benzaldehyde	++	++	o	o	-	V
Benzene (benzole)	++	++	+	-	-	V

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Benzene hexachloride	++	++	+	+	+	V
Benzene sulphonic acid	++	++	o	++	++	
Benzoic acid	++	++	+	++	++	
Benzyl acetate	++	++	+	-	-	V
Benzyl Alcohol	++	++	o	+	+	V
Bicarburetted soda	++	++	++	++	++	
Bichromate sulphuric acid	o	-	+	++	++	
Bicycle oil	++	++	+	o	o	
Bismuth compounds						See page 24
Bismuth trichloride	++	++	o	+	+	
Bitumen	++	++	+	o	o	V
Blankite	++	++	++	++	++	O ₂ ,CO ₂
Bleaching liquor	+	-	++	++	++	
Bleaching lye	+	-	++	++	++	
Bleaching powder	++	+	++	++	++	
Blue ashes	++	++	++	++	++	
Borax	++	++	++	++	++	
Boric acid	++	++	++	++	++	
Boric acid solution	++	++	++	++	++	
Braking fluids	++	++	o	+	+	
Brass polish	++	++	+	++	++	
Brillantine	++	++	+	+	o	
Brine	++	++	++	++	++	

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Bromine	-	-	-	-	-	
Bromobenzene(-benzole)	++	++	+	-	-	
Bromophorm	++	++	+	-	-	
Butane diol	++	++	+	++	++	
Butanol	++	++	+	+	+	V
Butter	++	++	+	+	o	CO2
Butyl acetate	++	++	o	-	-	V
Butyl alcohol	++	++	+	+	+	V
Butyl chloride	++	++	+	-	-	
Butyl phenol	++	++	o	+	o	
Butylraldehyde	++	++	o	o	o	
Butyric acid	++	++	o	+	+	V
C						
Cadmium salts						See page 24
Cadmium suphide	++	++	++	++	++	
Caffeine and its salts	++	++	++	++	++	
Calcium hydroxide	++	++	++	++	++	CO2
Calcium hypochlorite	++	+	++	++	++	
Calcium salts						See page 24
Californian mixture	++	++	++	++	++	CO2
Calomel	++	++	++	++	++	
Camphor	++	++	o	o	o	V
Camphor oil	++	++	+	o	o	V

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Caprolactam	++	++	+	++	++	
Carbazole	++	++	++	+	o	V
Carbolineum	++	++	o	o	-	V
Carbon black	++	++	++	++	++	
Carbon disulphide	++	++	+	-	-	
Carbon tetrachloride	++	++	+	-	-	
Carnauba wax	++	++	+	+	+	
Castor oil	++	++	o	+	o	
Cattle feed	++	++	++	++	++	
Caustic potash	++	++	+	++	++	CO2
Caustic soda	++	++	+	++	++	CO2
Cellosolve	++	++	+	+	o	
Cellulose varnish	++	++	o	-	-	
Cetyl alcohol	++	++	+	+	+	
Chloral (+chloral hydrate)	++	++	o	o	o	V
Chloro-acetic acids	++	++	o	++	++	V
Chloroamine	++	++	++	++	++	
Chlorobenzene (-benzole)	++	++	+	-	-	
Chloroform	++	++	+	-	-	
Chloronitrobenzene - liquid	++	++	o	o		V
Chloronitrobenzene - solid	++	++	+	+		V
Chlorophenol (mono, etc.)	++	++	+	o	-	V
Chloropropionic acid	++	++	o	++		

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Chlorosulphonic acid						not recommended
Chromate yellow	++	++	++	++	++	
Chromatic acid	+	-	+	++	++	
Chromium salts						See page 24
Cinnamon	++	++	++	+	+	V
Cinnamon oil	++	++	+	-	-	
Citric acid	++	++	++	++	++	
Citronel oil	++	++	+	-	-	
Clove oil	++	++	+	o	o	V
Cloves	++	++	+	+	+	V
Cobalt salts						See page 24
Coconut fat	++	++	+	++	++	
Coconut oil	++	++	+	+	+	
Codliver oil	++	++	+	+	+	CO2
Coffee	++	++	++	o	o	V
Colophonium(resin)	++	++	++	++	++	
Copper green	++	++	++	++	++	
Copper oxide	++	++	++	++	++	
Copper oxychloride	++	++	++	++	++	
Copper salts						See page 24
Cotton-seed oil	++	++	+	+	o	
Cream (face , hands)	++	++	+	+	+	
Creolin	++	++	o	o	-	V

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Creosote	++	++	o	o	-	V
Cresol (ortho,meta,para)	++	++	o	o	o	V
Crude oils (minerals)	++	++	o	o	o	V
Cyanamide	++	++	++	++	++	
Cyclohexane	++	++	o	o	-	V
Cyclohexanol	++	++	o	+	+	V
Cyclohexanone	++	++	o	o	o	V
D						
DDT (powder)	++	++	+	++	++	
Decalin	++	++	+	-	-	
Detergents (liquid)	++	++	o	++	++	
Detergents (powder)	++	++	+	++	++	
Developer (phot.)	++	++	++	++	++	
Dextrin	++	++	++	++	++	
Dibutyl phthalate	++	++	o	+	++	
Dichlorobenzene (-benzole)	++	+	+	-	-	
Dichloroethylene	++	++	+	-	-	
Dichloromethane	++	++	+	-	-	
Diesel oil	++	++	+	o	o	V
Diethanol amine	++	++	+	++	++	CO2
Diethyl ether	++	++	++	-	-	
Diethyl Ketone	++	++	o	o	-	
Diethylene glycolether	++	++	o	+	+	V

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Dimethyl formamide	++	++	+	+	+	
Diethyl phthalate	++	++	+	+	+	
Dioxane	++	++	o	o	o	V
Diphenyl amine	++	++	+	+	+	V
Diphenyl ether	++	++	+	o	-	V
Diphenyl oxide	++	++	+	o	-	V
Dolomite	++	++	++	++	++	
E						
Eau de cologne	++	++	+	o	o	V
Eau de Javelle	+	-	++	++	++	
Emulsion paint	++	++	++	++	++	
Engine oil	++	++	+	o	o	
Epsom salt	++	++	++	++	++	
Ether	++	++	o	-	-	V
Etheric oil	++	++	+	-	-	
Ethyl acetate	++	++	o	o	-	V
Ethyl alcohol	++	++	+	+	+	
Ethyl aniline	++	++	+	o	o	V
Ethyl benzene (-benzole)	++	++	+	-	-	
Ethyl benzoate	++	++	o	o	o	V
Ethyl chloride	++	++	+	-	-	
Ethylene chloride (mono,di)	++	++	+	-	-	
Ethylene chlorohydrine	++	++	+	-	-	

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Ethylene diamine	++	++	+	+	+	V, CO2
Ethylene glycol	++	++	+	++	++	
Ethylene salicylate	++	++	+	o	o	V
F						
Ferric salts						See page 24
Ferrous salts						See page 24
Fertilizer	++	++	++	++	++	®
Fir-needle oil	++	++	+	-	-	V
Fixative (phot)	++	++	++	++	++	
Floor wax	++	++	o	o	o	
Formaldehyde 40%	++	++	+	+	+	V
Formaline	++	++	+	+	+	V
Formamide	++	++	+	+	+	
Formic acid	++	++	+	++	++	V
Freon	++	++	+	-	-	
Frigen	++	++	+	-	-	
Fruit juice	++	++	++	++	++	
Fuel oil	++	++	+	o	o	
Fuel oil (domestic use)	++	++	+	o	o	V
fungicides	++	++	++	++	++	
Furfural	++	++	+	o	o	V
Furfuryl alcohol	++	++	o	-	-	
G						

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Gallic acid (tannic acid)	++	++	+	++	++	
Galvanizing liquor	++	++	++	++	++	
gas liquor	++	++	+	+	+	
gasoline	++	++	+	o	-	V, HD grades only
Glacial-acetic acid	++	++	o	o	o	V
Glauber salt	++	++	++	++	++	
Glucose	++	++	++	++	++	
Glue (fish,bone)	++	++	++	++	++	
Glycerine (glycerol)	++	++	++	++	++	
Glycol	++	++	+	++	++	
Gypsum	++	++	++	++	++	
H						
Heptane	++	++	+	-	-	
Hexachlorocyclohexane	++	++	+	+	+ v	
Hexane	++	++	+	-	-	
Hexanol	++	++	+	+	+	V
Hexylalcohol	++	++	+	+	+	V
Honey	++	++	++	++	++	
Hydrobromic acid	++	++	++	++	++	
Hydrochloric acid	++	++	++	++	+	
Hydrochloric acid (chem.pure)	++	++	++	++	++	
Hydrocyanic acid	++	++	+	o	o	V, CO2
Hydrofluoric acid	++	++	+	+	+	V,CO2

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Hydrogen peroxide (sol.)	+	+	++	++	o	
Hydroquinone	++	++	++	++	++	
Hypo	++	++	++	++	++	
I						
I cont.						
Ink (printing ink)	++	++	+	+	o	
Ink (writing ink)	++	++	++	++	++	®
Insecticides (oilsolution)	++	++	o	-	-	
Insecticides (powder)	++	++	+	+	+	
Insecticides(aqueous dispersion)	++	++	+	++	++	
Iodine	++	++	+	o	o	
Iodine tincture	++	++	+	+	o	
Iron salts						See page 24
Isobutanol	++	++	+	+	+	V
Isobutyl alcohol	++	++	+	+	+	V
Iso-Octane	++	++	+	o	-	V, see gasoline
Isopropyl acetate	++	++	+	o	o	V
Isopropyl ether	++	++	+	-	-	
J						
Jam	++	++	++	++	++	
K						
Kerosene	++	++	+	o	-	V,see gasoline
Ketchup	++	++	++	++	++	
L						

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Lactic acid	++	++	+	++	++	
Lanolin	++	++	+	+	+	
Lard	++	++	+	+	o	
Latex	++	++	+	++	++	
Lauryl alcohol	++	++	+	+	+	
Lauryl sulphate	++	++	o	+	+	
Lead acetate	++	++	++	++	++	
Lead oxide	++	++	++	++	++	
Lead salts						See page 24
Lemon oil	++	++	+	-	-	
Lime milk	++	++	+	++	++	
Lime salts						See page 24
Lime, slaked	++	++	++	++	++	
Lime, unslaked	++	++	++	++	++	
Lindane powder	++	++	+	+	+	
Linseed oil	++	++	+	+	o	
Lithium salts						See page 24
Liver of sulphur						see sodium sulphide
Lotion (hair, shaving)	++	++	+	+	o	
Lubricating oil	++	++	+	o	o	
M						
Magnesia	++	++	+	++	++	
Magnesium oxide	++	++	+	++	++	

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Magnesium salts						See page 24
Maleic acid	++	++	+	++	++	
Manganese salts						See page 24
Margarine	++	++	+	+	o	
Mayonnaise	++	++	+	++	o	
Menthol	++	++	+	+	o	V
Mercuric salts						See page 24
Mercurochrome	++	++	++	++	++	
Mercurous salts						See page 24
Mercury (metal)	++	++	++	++	++	
Mercury oxide	++	++	++	++	++	
Mercury salts						See page 24
Methanol	++	++	o	+	+	
Methyl acetate	++	++	o	o	o	V
Methyl alcohol	++	++	o	+	+	
Methyl salicylate	++	++	+	o	o	V
Methylene chloride	++	++	+	-	-	
Methylethylene ketone	++	++	o	o	-	
Milk	++	++	++	++	++	
Mineral oil	++	++	+	+	o	
Minerals	++	++	++	++	++	
Mohr's salt	++	++	++	++	++	

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Monochlorobenzene(-benzole)	++	++	+	-	-	
Morpholine	++	++	o	+	+	V
Mustard	++	++	++	++	++	
N						
Nail varnish	++	++	o	o	-	
Naphthalene	++	++	+	o	o	V
nickel oxide	++	++	++	++	++	
Nickel salts						See page 24
Nicotine	++	++	+	+	+	
Nitric acid (<=50%)	+	++	++			
Nitric acid (>50%)	-	-	o	+	+	
Nitrobenzene (-benzole)	++	++	o	o	o	V, not recommended
Nitrocresole	++	++	+	o	o	
Nitroglycerine	++	++	+	o	o	
Nonyl alcohol	++	++	+	o	o	V
Nutmeg	++	++	++	o	o	V
Nutmeg oil	++	++	+	-	-	
O						
Ochre	++	++	++	++	++	
Octane	++	++	+	o	-	V, see gasoline
Octanol	++	++	+	o	o	
Octyl alcohol	++	++	+	o	o	V
Oleic acid	++	++	+	+	o	

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Oleum	o	-	o	+	+	not recommended
Olive oil	++	++	+	+	o	
Oxalic acid (solid or solution)	++	++	++	++	++	
P						
Paint						see terpentine, varnish & emulsion paint
Palm oil	++	++	+	+	o	®
Palmitinic acid	++	++	+	++	++	
Paraffin (solid)	++	++	+	++	++	
Paraffin oil	++	++	+	o	-	
Patent potash	++	++	++	++	++	
Peanut butter	++	++	+	+	o	
Pentachlorophenol	++	++	++	o	o	V
Pentane	++	++	+	-	-	
Pepper	++	++	++	++	++	
Peppermint oil	++	++	+	-	-	V
Perchloric-acid solution	+	o	++	++	+	
Perchloroethylene	++	++	+	-	-	
Perfumes	++	++	+	o	-	V, not recommended
Petrol						see gasoline
Petroleum	++	++	+	o	-	V
Petroleum ether	++	++	+	o	-	V
Phenol	++	++	o	+	+	V

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Propanol	++	++	+	+	+	
Propargyl alcohol	++	++	+	+	+	
Propionic acid	++	++	o	++	++	V
Propylene glycol	++	++	+	++	++	
Propyl alcohol	++	++	+	+	+	
Prussic acid	++	++	+	o	o	V, very hazardous
Pyridine	+	++	o	o	o	V
Q						
Quinine ad its salts	++	++	++	++	++	
R						
Ratbane	++	++	++	++	++	
Red ochre						See page 24
Resorcine (resorcinol)	++	++	++	++	++	
Ricinus oil	++	++	o	+	o	
S						
Salad oil	++	++	+	+	o	
Salas sauce	++	++	+	++	o	
Salicyl aldehyde	++	++	+	o	o	v
Salicylic acid	++	++	++	++	++	
Salmiac	++	++	++	++	++	
Saltpetre (nitrate)						See page 24
Saponin	++	++	++	++	++	
Scouring powder	++	++	+	++	++	
Sesame oil	++	++	+	+	o	

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Shampoo	++	++	0	++	++	
Silicone oil	++	++	0	+	+	
Silver polish	++	++	+	++	++	
Silver salts						See page 24
Soap(soft, green & yellow)	++	++	0	++	++	
Soda	++	++	++	++	++	
Sodium cyanide	++	++	+	+	+	hazardous
Sodium hydroxide	++	++	+	++	++	CO ₂
Sodium hypochlorite	+	-	+	++	++	
Sodium salts						See page 24
Sodium sulphide	++	++	+	+	+	O ₂ , CO ₂
Soldering fluid	++	++	++	++	++	
Solvent naphtha	++	++	+	-	-	
Soy oil	++	++	+	+	0	
Spermaceti	++	++	+	+	+	
Spindle oil	++	++	+	0	0	
Spirit	++	++	+	+	+	
Stannic salts (tin)						See page 24
Stannous salts (tin)						See page 24
Starch	++	++	++	++	++	
Stearic acid	++	++	++	++	++	
Strontium salts						See page 24
Styrene (styrol)	++	++	+	0	-	

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Sublimate	++	++	++	++	++	
Succinic acid	++	++	++	++	++	
Sucrose	++	++	++	++	++	
Sugar	++	++	++	++	++	
Sulphate of ammonia						See page 24
Sulphur	++	++	++	++	++	
Sulphur chloride						not recommended
Sulphur trioxide	o	-	o	+	0	V, not recommended
Sulphuric acid (50-90%)	+	+	+	++	++	
Sulphuric acid (90-100 %)	o	o	+	++	++	
Sulphuric acid (dilute)	++	++	++	++	++	
Sulphuryl chloride						not recommended
Superphosphate	++	++	++	++	++	
Syrup	++	++	++	++	++	
T						
Talcum grease	++	++	+	+	o	
Talcum powder	++	++	++	++	++	
Tannic acid	++	++	+	++	++	
Tannin	++	++	+	++	++	
Tar oil	++	++	o	o	o	V
Tartaric acid	++	++	++	++	++	
Tea	++	++	++	++	++	
Tetra						see "carbon tetrachl

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Tetra-ethyl lead						
Tetra-ethyl lead						
Tetrahydroethane	++	++	+	-	-	
Tetrahydrofuran	++	++	0	-	-	
Tetralin	++	++	+	-	-	
Thallium salts						See page 24
Thio(sodium thiosulphate)						See page 24
Thioglycolic acid	++	++	+	o	o	V
Thionylchloride						not recommended
Thiophene	++	++	o	-	-	
Thomas meal	++	++	++	++	++	
Tin compounds						See page 24
Titanium tetrachloride						not recommended
Titanium white	++	++	++	++	++	
Toluene (toluol)	++	++	+	-	-	V
Tomato juice	++	++	++	++	++	
Toothpaste	++	++	+	+	+	
Transformer oil	++	++	+	o	o	
Trichloro-acetic acid	++	++	o	+o	v	
Trichlorobenzene (benzole)	++	++	+	-	-	
Trichloroethane	++	++	+	-	-	
Trichloroethylene	++	++	+	-	-	

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Tricresylphosphate	++	++	0	+	+	
Triethanolamine (turkey red oil)	++	++	0	++	++	
Turkey red oil	++	++	+	+	+	
Turpentine	++	++	+	-	-	
Turpentine (synthetic)	++	++	+	0	-	
Turpentine varnish	++	++	+	0	-	O2, not recommended
U						
Urea	++	++	++	++	++	
V						
Vanilla extract	++	++	+	0	0	V
Varnish						see turpentine varnish
Vaselin	++	++	+	+	0	
Vinegar	++	++	++	++	++	
Vinylchloride	++	++	+	-	-	
W						
Waterglass	++	++	+	++	++	
Wax: beeswax	++	++	+	+	+	
Wax: carnauba wax	++	++	+	+	+	
Wax: mineral-oil wax	++	++	+	+	0	
White lead	++	++	++	++	++	
White spirit	++	++	+	0	-	
X						
Xylene (xylol)	++	++	+	-	-	
Y						

Chemicals	Resistance to Chemical attack		Resistance to Physical attack	Permeability		Remarks
	+20°C	+60°C		+40°C	+60°C	
Yeast	++	++	++	++	++	
Yoghurt	++	++	++	++	++	
Z						
Zinc white	++	++	++	++	++	
Zinc, salts						See page 24

Metal salts

In the following table the resistance of polyethylene is evaluated to the action of various chemicals. Salts (and their solutions) whose chemical names can be composed out of the diagram are not included in the tables. These metal salts, nor solid nor in an aqueous solution, have no influence on polyethylene.

Metals		Salts	
Aluminium	Nickel	acetate	hydrosulphate
Ammonium	Potassium	arsenate	iodate, iodite
Antimony	Silver	benzoate	metaphosphate
Barium	Sodium	borate	molybdate
Bismuth	Strontium	bromate	nitrate
Cadmium	Thallium	bromide	nitrite
Calcium	Tin	carbonate	oxalate
Chromium	Zinc	chlorate	perborate
Cobalt		chloride	persulphate
Copper		chromate	phosphate, phosphite
Iron		dicarbonate	rhodanide
Lead		dichromate	salicylate
Lithium		disulphate	silicate
Magnesium		ferric/ferrous cyanide	silicofluoride
Manganese		fluoride	sulphate, sulphite
Mercury		formiate	thiosulphate
Molybdenum		gluconate	