Celanese
The chemistry inside innovation™

GUR® PE-UHMW GHR® PE-HMW

Resistance to chemicals and other media

RESISTANCE TO CHEMICALS AND OTHER MEDIA

The unpolar structure of GUR® (PE-UHMW) and GHR® (PE-HMW) affords them an unusually high resistance to chemicals and other media. They are resistant to aqueous solutions of salts, non-oxidising acids[1]) and alkalis.

GUR and GHR are resistant to a variety of solvents up to a temperature of 60 °C, but aromatic and halogenated hydrocarbons and certain oils, fats and waxes cause them to swell up. This swelling is only minor, however, up to temperatures ≈ 30 °C.

When exposed to strong oxidising materials such as nitric acid, ozone, oleum, hydrogen peroxide or halogens, GUR and GHR are either resistant under limited condition or not resistant at all. We are happy to provide more information on request.

Internal stresses which result from the manufacturing process, as well as stress arising from loading, and higher temperatures, can significantly reduce the resistance depending upon which medium is present.

Thus the combined effect of mechanical stress and washing liquor, or some other wetting material, can lead to the development of stress cracks.

DESIGN INSPECTION

The results of numerous chemical resistance tests are summarised in the following table. It provides information about changes which can be observed when certain named materials are used. These details are not, however, a replacement for the tests which should be undertaken to demonstrate compatibility[2]) to chemicals as a part of an overall design test series.

Proof of compatibility to chemicals can be obtained from one of the testing institutes which have been licensed by the Federal Institute for Material Development and Testing.

TABLE

Plastic test pieces were laid in the substance concerned for 60 days without being subjected to any mechanical stress and inspected for any swelling or weight loss and were also subjected to a tensile test.

Test piece: 50 mm x 25 mm x 1 mm and Test Piece 3 according to DIN 53 455, whose dimensions are in the relationship 1:4, both of which were removed from a pressed plate.

What the signs mean:

+	= resistant	swelling < 3 % or weight loss < 0,5% elongation at break, not significantly changed
/	= only partly resistant	swelling of 3 % to 8 % or a weight loss of 0,5 % to 5 % and/or elongation at break reduced by < 50 %
–	= not resistant	swelling > 8 % or weight loss > 5 % and/or elongation at break reduced by > 50 %

V = discoloration may occur

** = or boiling temperature

* = not valid for welded joints (including edge welding); information is available from ourselves or from the semi finished product manufacturer

1 The influence of strong acids can lead to colour changes, particularly in coloured materials

2 according to RM 001 (Transportation by ship) GGVE/RID, Annexe V (Transportation by rail) GGVS/ADR, Annexe A5 (Transportation by road)

RESISTANCE TO CHEMICALS AND OTHER MEDIA

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Acetaldehyde	technical	+	/
Acetaldehyde + acetic acid	90:10	+	
Acetaldehyde, aqueous	each	+	/
Acetamide		+	+
Acetic acid	100%	+	/V
Acetic acid, aqueous	70%	+	+
Acetic anhydride	technical	+	/
Acetoacetic acid		+	
Acetone	technical	+	+*
Acetophenone		+	
Acetylene		+	
Acids, aromatic		+	+
Acronal®-dispersions	commercial	+	/
Acrylonitrile	technical	+	+
Adipic acid, aqueous	saturated	+	+
Air	technical	+	+
Aktivin® (chloramine, aqueous, 1%)		+	+
Allyl acetate		+	+ to /
Allyl alcohol (prop-2-en-1-ol)	96%	+	+
Allyl chloride		/	–
Alum, aqueous	each	+	+
Aluminium chloride, aqueous	each	+	+
Aluminium chloride, solid		+	+
Aluminium fluoride	conc.	+	+
Aluminium hydroxide		+	+
Aluminium metaphosphate		+	+
Aluminium potassium sulphate, aqueous	each	+	+
Aluminium sulphate, aqueous	saturated	+	+
Aluminium sulphate, solid		+	+
Amino acids		+	+
Ammonia water		+	+
Ammonia water (household ammonia)	each	+	+
Ammonia, gaseous		+	+
Ammonia, liquid		+	
Ammonium acetate, aqueous	each	+	+
Ammonium carbonate, aqueous	each	+	+
Ammonium chloride, aqueous	each	+	+
Ammonium fluoride, aqueous	saturated	+	+
Ammonium hydrogencarbonate, aqueous	saturated	+	+
Ammonium hydrosulphide, aqueous	each	+	+
Ammonium iron(III) sulphate (iron alum), aqueous	saturated	+	+
Ammonium metaphosphate		+	+
Ammonium nitrate, aqueous	each	+	+
Ammonium phosphate, aqueous	each	+	+

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Ammonium sulphate, aqueous	each	+	+
Ammonium sulphide, aqueous	each	+	+
Ammonium thiocyanate		+	+
Amyl acetate	technical	+	+
Amyl alcohol (C_5-alcohols)	technical	+	+
Amyl chloride	100%	/	–
Amyl phthalate		+	/
Aniline	each	+	+
Aniline hydrochloride, aqueous	each	+	+
Animal oil		+	/
Aniseed oil		/	–
Anisol		/	/ to –
Anon (Cyclo hexanon)		+	/
Anthraquiquinonesulphonic acid, aqueous (susp.)		+	+
Anti-freezing agent (car)	commercial	+	+
Antimony chloride, free from water		+	+
Antimony pentachloride		+	+
Antimony trichloride		+	+
Apple wine		+	+
Aqua regia (HCl + HNO_3)		–	
Arsenic pentaoxide		+	+
Arsenious acid, aqueous	each	+	+
Ascorbic acide		+	+
Asphalt		+	/V
Aspirin®		+	
Barium hydroxide, aqueous	each	+	+
Barium salts, aqueous	each	+	+
Battery acid		+	+
Beef fat		+	+ to /
Beer		+	+
Beer liquor	commercial	+	+
Beeswax		+	/ to –
Benzaldehyde in propan-2-ol	1%	+	+
Benzaldehyde, aqueous	each	+	+ to /
Benzene	technical	/	–
Benzin/Benzene-mixture	80 / 20	+	/
Benzine	technical	+	/
Benzoic acid, aqueous	each	+	+
Benzoyl chloride		/	/
Benzyl alcohol		+	+
Benzyl chloride		/	–
Bismuth salts		+	+
Bisulphite liquor		+	+

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Bitter salt, aqueous	each	+	+
Bitumen		+	/V
Bleaching liquor with 12.5% active Chlorine**		/	–
Bone oil		+	+
Borax (sodium tetraborate), aqueous	saturated	+	+
Boric acid methyl ester		+	/ to –
Boric acid, aqueous	each	+	+
Boron trifluoride		+	+ to /
Brake fluid		+	+
Brandy		+	
Bromchlormethane		–	
Bromic acid	conc.	–	
Bromine vapour		–	
Bromine water	cold saturated	+	
Bromine, liquid	100%	–	
Bromomethane (methyl bromide), gaseous	technical	–	
Buta 1,3-dien, gaseous	technical	/	–
Butane, gaseous		+	
Butane-diol, aqueous	each	+	+
Butane-triol, aqueous	each	+	+
Butanol		+	+
Butanol, aqueous	each	+	+
Butanone		+	/ to –
2-Butendiole-1,4	technical	+	
2-Butindiole-1,4	technical	+	
Butoxyl® (methoxybutylacetate)		+	/
Butter		+	
Butyl acetate	technical	+	/
Butyl acetate		+	/
Butyl acrylate		+	/
Butyl phenol	technical	+	+
Butyl phenone	technical	–	
Butylbenzylphthalate		+	+
Butylene glycol	technical	+	+
Butylene glycol (ethylene glycol butyl ether)	technical	+	
Butylphthalate (Di-butylphthalate)	technical	+	/
Butyric acid, aqueous	each	+	/
Calcium carbide		+	+
Calcium carbonate		+	+
Calcium chlorate, aqueous	saturated	+	+
Calcium chloride, aqueous	saturated	+	+
Calcium hydroxide		+	+
Calcium hypochlorite, aqueous (suspension)	each	+	+
Calcium nitrate, aqueous	50%	+	+
Calcium oxide (powder)		+	+
Calcium phosphate		+	+

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Calcium sulphate		+	+
Calcium sulphide, aqueous	P 10%	/	/
Camphor		+	/
Camphor oil		–	
Cane sugar, aqueous	each	+	+
Carbazole		+	+
Carbolic acid (phenol)		+	+V
Carbolineum	commercial	+	
Carbon dioxide	100%	+	+
Carbon disulphide		/	
Carbon monoxide, gaseous	technical	+	+
Carbonic acid, aqueous	each	+	+
Carbonic acid, dry	100%	+	+
Castor oil		+	+
Caustic potash		+	+
Caustic potash	50%	+	+
Caustic soda		+	+
Caustic soda	each	+	+
Cellulose nitrate		+	
Cetyl alcohol (hexadecan-1-ol)		+	+
Chloral (Trichloroacetaldehyde)	technical	+	+
Chloral hydrate, aqueous	each	+	+V
Chloramine, aqueous	saturated	+	
Chloric acid, aqueous	1%	+	+
Chloric acid, aqueous	10%	+	+
Chlorinated bleaching liquor with 12,5% active Chlorine**		/	–
Chlorinated lime		+	+
Chlorine water	saturated	+	/
Chlorine, aqueous solution (chlorine water)	saturated	+	/
Chlorine, gaseous, dry		/	–
Chlorine, gaseous, moist		/	–
Chlorine, liquid		–	
Chloroacetic acid (mono), aqueous	each	+	+
Chloroacetic acid, aqueous	P 85%	+	+
Chlorobenzene		/	–
Chloroethane (ethyl chloride)	technical	/	
Chloroethanol (ethylene chlorhydrin)	technical	+	+V
Chloroform	technical	/ to –	–
Chloroformic acid ester		+	/
Chloromethane (methyl chloride), gaseous	technical	/	
Chlorosulphuric acid	technical	–	
Chlorpicrin		+ to /	–
Chromanode sludge		+	+
Chrome alum (chrome potash alum), aqueous	saturated	+	+
Chromic acid, aqueous**	50%	/	–V
Chromic-sulphuric acid mixture		–	

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Chromium salts, aqueous	each	+	+
Chromium trioxide, aqueous**	50%	/	–V
Cider		+	+
Citric acid, aqueous	saturated	+	+
Citric juices		+	+
Citrus juices		+	+
Clophen® A50 and A60		+	/ to –
Coal-tar oil		+V	/V
Coconut oil		+	
Coconut oil alcohol	technical	+	/
Cod-liver oil		+	/
Cognac		+	
Cola concentrate		+	+
Common salt, aqueous	each	+	+
Copper chloride, aqueous	saturated	+	+
Copper fluoride, aqueous	saturated	+	+
Copper nitrate, aqueous	30%	+	+
Copper salts, aqueous	cold saturated	+	+
Copper sulphate, aqueous	each	+	+
Copper(I) cyanide, aqueous	saturated	+	
Cotton-seed oil	technical	+	+
Creosol	100%	+	/V
Creosol, aqueous	diluted	+	+V
Creosote		+	+V
Crotonaldehyde	technical	+	/
Cumaron resin		+	+
Cyclanon (Fatty alcohol sulphonate)	commercial	+	+
Cyclohexane		+	+
Cyclohexanol		+	+
Cyclohexanone (anone)		+	/
Deca hydronaphthaline (Dekalin®)	technical	+	/
Defoaming agent		+	+ to /
Detergentien		+	+
Detergents	usual	+	+
Developer (photographic)		+V	+V
Dextrin (starch gum), aqueous	18%	+	+
Dextrose		+	+
1,2-diaminoethane (ethylenediamine)	technical	+	+
1,2-Dibromethane		/	–
Di-butylphthalate (Butylphthalate)	technical	+	/
Dibutyl ether		+ to /	–
Dibutyl sebacate		+	/
Dichloroacetic acid	50%	+	+
Dichloroacetic acid	technical	+	/V
Dichloroacetic acid methyl ester		+	+
Dichlorobenzene		/	–

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Dichlorodiphenyltrichloroethane (DDT, powder)		+	+
Dichloroethane		/	/
1,1-dichlorethylene (vinylidene chloride)	technical	–	
Dichloropropane		/	–
Dichloropropene		/	–
Diesel fuel		+	/
Diethanolamine	technical	+	
Diethyl ether		+ to /	/*
2-Di-ethylhexylphthalate (DOP)		+	/
Diethyl ketone		+	/
Diethylene glycol		+	+
Diglycolic acid, aqueous	30%	+	+
Diisobutyl ketone	technical	+	/ to –
Diisooctyl phthalate	technical	+	/
Diisopropyl ether		+ to /	–
Dimethyl formamide	technical	+	+ to /
Dimethyl sulphoxide		+	+
Dimethylamine		+	/
Dinonyl phthalate (DNP)	technical	+	/
Dioctyl phthalate		+	/
Dioxane		+	+
Diphenyl ether		+	/
Diphenylamine		+	/
Disodium phosphate		+	+
Disodium sulphate		+	+
Do-decyl benzole sulphonic acid		+	/
Drilling medium from „Hoechst“		/	/
Drinking water, also chlorinated		+	+
Dutch glue (Gluten glue)	commercial	+	+
Dye		+V	+V
Eau de Javelle		+ to /	–
Eau de Labarraque		+ to /	
Elektrolytic baths for galvanotechnics		+ to /	/
Emulsifying agents		+	+
Emulsions (photographic)		+	+
Emulsions (photographic)	commercial	+	
Ephetin®, aqueous	10%	+	+
Epichlorhydrine		+	+
Ester of adipic acid		+	/
Ester, aliphatic	technical	+	+ to /
Ethane		+	+
Ethanol	96%	+	+
Ethanol amine (2-aminoethanol)	technical	+	
Ethanol, denaturated with toluene	96% (vol.)	+	
Ether		+ to /	/*
Etherial oils		/	–

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Ethyl acetate		+	/
Ethyl acetate	technical	+	/
Ethyl alcohol	96%	+	+
Ethyl alcohol + acetic acid (fermentation mixture)	usual in the works	+	+
Ethyl benzene	technical	/	
Ethyl chloride (chloroethane)	technical	/*	
Ethyl ether	technical	+ to /	/*
2-Ethyl hexanol		+	/
Ethylene		+	+
Ethylene chlorohydrin (chlorethanol)	technical	+	+
Ethylene dibromide		/	–
Ethylene dichloride (dichloroethane)		/	–
Ethylene glycol	+	+	+
Ethylene glycol butyl ether (Butylene glycol)	technical	+	
Ethylene oxide, gaseous	technical	+	+
Ethylenediamine (1,2-diaminoethane)	technical	+	+
Ethylenediamine tetraacetic acid		+	+
Euron® B		/	/
Euron® G		+	+
Fatty acids (> C6)		+	+ to /
Fatty alcohol		+	/
Fatty amide		+	/
Fermentation mash	commercial	+	+
Ferric cyan potassium and Ferro-Z, aqueous	each	+	+
Fertilizing salts, aqueous	each	+	+
Fixing bath (photographic)	commercial	+	
Fixing salt, aqueous	each	+	+
Fixing salt, solid		+	+
Fluorine, gaseous		–	
Fluoroboric acid, aqueous		+	/
Fluorosilicic acid	each	+	+
Fluorosilicic acid, aqueous	each	+	+
Formaldehyde, aqueous	up to 40%	+	+
Formamide		+	+
Formic acid, aqueous	85%	+	+
Formic acid, aqueous	10%	+	+
Frigen® 12 (Freon® 12)	100%	/	–
Fructose (fruit sugar), aqueous	each	+	+
Fruit juices	each	+	+
Fruit juices, fermented		+	+
Fruit juices, unfermented	each	+	+
Fruit pulp		+	+
Fruit tree carbolineum, aqueous		+V	/V
Furfural		+	/
Furfuryl alcohol		+	+V
Gelatine		+	+

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Genantin®		+	+
Gin		+	
Glacial acetic acid (100% acetic acid)	technical	+	/V
Glauber salt, aqueous	each	+	+
Glucose, aqueous	each	+	+
Glucose, aqueous	each	+	+
Glue		+	+
Glycerol chlorohydrin		+	+
Glycerol, aqueous	each	+	+
Glycocoll		+	+
Glycol acid butyl ester		+	+
Glycol, aqueous	commercial	+	+
Glycolic acid, aqueous	up to 70%	+	+
Glysantine		+	+
Grisiron® 8302		/	/
Grisiron® 8702		+	+
Halothan®		/	/ to –
Heating oil		+	/
Heptane		+	/
Hexafluorosilicic acid, aqueous	40%	+	+
Hexane		+	/
Hexantriol		+	+
Honey		+	+
Household ammonia (ammonia water)	each	+	+
Hydraulic fluid		+	/
Hydrazine hydrate		+	+
Hydrobromic acid, aqueous	50%	+	+
Hydrochloric acid		+	/
Hydrochloric acid, aqueous	each	+	+
Hydrofluoric acid, aqueous	40% ... 85%	+	/
Hydrogen		+	+
Hydrogen Bromide, gaseous	technical	+	+
Hydrogen chloride gas, dry and moist		+	+
Hydrogen peroxide, aqueous	10%	/	–
Hydrogen peroxide, aqueous	30%	/	–
Hydrogen sulphide, aqueous	saturated	+	+
Hydrogen sulphide, gaseous		+	+
Hydrogenic cyanide		+	+
Hydroquinone		+V	+V
Hydrosulphite, aqueous	up to 10%	+	+
Hydroxylammonium sulfaphate, aqueous	12%	+	+
Illuminating gas	commercial	+	
Ink		+	+
Instant coffee		+	+
Iodine-potassium iodine	3% iodine	+	+
Iron alum (ammonium iron(III) sulphate), aqueous	saturated	+	+

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Iron potassium cyanide, aqueous	each	+	+
Iron(II) chloride, aqueous	saturated	+	+
Iron(II) sulphate, aqueous	saturated	+	+
Iron(III) chloride , aqueous	each	+	+
Iron(III) chloride, aqueous	saturated	+	+
Iron(III) nitrate, aqueous	saturated	+	+
Iron(III) sulphate, aqueous	saturated	+	+
Isoamyl alcohol	technical	+	/
Isobutyl alcohol		+	+
Isobutyric acid	technical	+	/
Isooctane		+	/
Isopropyl acetate	100%	+	/
Isopropyl ether	technical	+ to /	–
Jam		+	+
Kerosene		+	/
Kerosine		+	/
Ketone		+ to /	/ to –
Lactic acid, aqueous	each	+	+
Lactose (milk sugar)		+	+
Lanoline (wool grease)		+	+
Latex		+	+
Lead acetate, aqueous	each	+	+
Lime		+	+
Lime water		+	+
Linseed oil	technical	+	+
Liqueur		+	
Liquid manure		+	+
Liquid soaps		+	+
Lithium bromide		+	+
Lubricating oils	technical	+	+ to /
Lysol®		+	/
Machine oil		+	/
Magnesium carbonate		+	+
Magnesium chloride, aqueous	each	+	+
Magnesium fluorosilicate		+	+
Magnesium hydroxide		+	+
Magnesium iodide		+	+
Magnesium salts, aqueous	each	+	+
Magnesium sulphate, aqueous	each	+	+
Maize oil		+	/
Maleic acid, aqueous	up to 100%	+	+
Malic acid, aqueous	50%	+	+
Mangan sulphate		+	+
Margarine		+	+
Mash		+	+
Mayonnaise		+	

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Menthol		+	/
Mercury		+	+
Mercury chloride		+	+
Mercury salts		+	+
Metallic mordant		+	
Metallic soaps		+	+
Methanol	technical	+	+
Methoxybutanol		+	/
Methoxybutylacetate (Butoxyl®)		+	/
Methyl acetate	technical	+	
Methyl acrylate		+	+
Methyl alcohol		+	+
Methyl benzene		/	–
Methyl bromide (Bromomethane), gaseous	technical	–	
Methyl chloride (chloromethane), gaseous	technical	/	
Methyl ethyl ketone	technical	+	/
Methyl methacrylate		+	+
Methyl propyl ketone		+	/
Methyl salicylate		+	/
Methyl sulphuric acid	50%	+	+
Methylacrylic acid		+	+
Methylamine, aqueous	32%	+	
Methylbenzoic acid (toluic acid)	saturated	/	
2-Methylbutan-2-ol	technical	+	/
Methylcyclohexane		/	/ to –
Methylene dichloride** (dichloromethane)		/	/*
Methylglycol		+	+
Methylisobutylketone		+	/ to –
4-Methylpentanol-2		+	+ to / V
Milk		+	+
Mineral oil	without additives	+	+ to /
Mineral water		+	+
Molasses		+	+
Molasses seasoning		+	+
Monochloro benzene		/	–
Monochloroacetic acid		+	+
Monochloroacetic acid ethyl ester		+	+
Monochloroacetic acid methyl ester		+	+
Morpholine		+	+
Motor oil (HD-oil)		+	+ to /
Mowilith®-dispersions		+	+
Mustard		+	+
N-methyl pyrrolidone		+	+
N-propanol (n-propylalcohol)		+	+
Nail lacquer remover		+	/
Naphtha		+	/

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Naphthalene		+	/
Natural gas	technical	+	
Nickel chloride		+	+
Nickel nitrate		+	+
Nickel salts, aqueous		+	+
Nickel sulphate, aqueous	each	+	+
Nicotine		+	+
Nicotonic acid	P 10%	+	
Nitric acid**	25%	+	+
Nitric acid**	50%	/	–
2,2',2''-Nitrilo triethanol (Triethanol amine), aqueous	each	+	/
Nitrobenzene		+	/
Nonyl alcohol (nonanol)		+	+
Nut oil		+	
O-Nitrotoluol		+	/
Octylcresol	technical	/	–
Odorous oils		/	–
Oils, etherial		/	–
Oils, vegetable and animal		+	+ to /
Oleic acid		+	/
Oleum (H_2SO_4 + SO_3)	each	–	
Olive oil		+	+
Optical brightening agent		+	+
Orange juice		+	+
Oxalic acid, aqueous	each	+	+
Oxygen		+	+
Ozone	50 pphm	/	–
Palm kernel oil		+	
Palmitic acid		+	+
Palmityl alcohol		+	+
Paraffin oil		+	+
Paraformaldehyde		+	+
Peanut oil	technical	+	
Pentanol		+	
Peppermint oil		+	
Perchlorethylene		/	–
Perchloric acid, aqueous	20%	+	+
Perchloric acid, aqueous	50%	+	/
Perchloric acid, aqueous	70%	+	–
Pesticides, aqueous	usal in practice	+	+
Petroleum ether		+	/
Phenol (carbolic acid)		+	+V
Phenolic moulding compound		+	+
Phenyl-sulphonic acid		+	+
Phenylethyl alcohol		+	+
Phenylhydrazine	technical	/	/ to –

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Phenylhydrazine hydrochloride		+	–
Phenylsulphonate (sodium dodecyl benzol sulphonate)		+	+
Phosgene, gaseous		/	
Phosgene, liquid	100%	–	
Phosphate, aqueous	each	+	+
Phosphoric acid, aqueous	50%	+	+
Phosphoric acid, aqueous	80% ... 95%	+	/V
Phosphorus pentaoxide	100%	+	+
Phosphorus trichloride		+	/
Phosphoryl chloride		+	/
photographic developer		+V	+V
Phthalic acid dibutyl ester (Dibutyl phthalate)	technical	+	/
Phthalic acid, aqueous	50%	+	+
Phthalic ester		+	+ to /
Picric acid, aqueous	1%	+	
Pine-needle oil		+	
Pineapple juice		+	+
Polyacrylic acid emulsions		+	+
Polyester resin		/	–
Polyester softener		+	+ to /
Polyglycol		+	+
Polysolvan® O (glycol acid butyl ester)		+	+
Potassium bicarbonate (potassium hydrogencarbonate), aqueous	saturated	+	+
Potassium bichromate, aqueous	each	+	+
Potassium bisulphate (potassium hydrogensulphate), aqueous	saturated	+	+
Potassium bisulphite (potassium hydrogensulphite), aqueous	saturated	+	+
Potassium borate, aqueous	1%	+	+
Potassium bromate, aqueous	up to 10%	+	+
Potassium bromide, aqueous	each	+	+
Potassium carbonate, aqueous	each	+	+
Potassium chlorate, aqueous	each	+	+
Potassium chloride, aqueous	each	+	+
Potassium chromate, aqueous	40%	+	+
Potassium chrome-(III)-sulphate (chrome alum), aqueous	saturated	+	+
Potassium cyanide, aqueous	each	+	+
Potassium cyanide, aqueous	each	+	+
Potassium dichromate, aqueous	saturated	+	+
Potassium fluoride, aqueous	each	+	+
Potassium hexacyanocuprate, aqueous	saturated	+	+
Potassium hexacyanoferrate, aqueous	each	+	+
Potassium hydrogencarbonate (potassium bicarbonate), aqueous	saturated	+	+
Potassium hydrogensulphate (potassium bisulphate), aqueous	saturated	+	+
Potassium hydrogensulphite (potassium bisulphite), aqueous	saturated	+	+
Potassium hydroxide, aqueous	each	+	+
Potassium hypochlorite, aqueous	saturated	/	–
Potassium iodide	each	+	+

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Potassium nitrate, aqueous	each	+	+
Potassium perborate		+	+
Potassium perchlorate, aqueous	up to 10%	+	/
Potassium perchlorate, aqueous	1%	+	
Potassium permanganate		+	+
Potassium permanganate, aqueous	up to 6%	+	+V
Potassium persulphate, aqueous	each	+	+
Potassium phosphate, aqueous	saturated	+	+
Potassium sulphate, aqueous	each	+	+
Potassium sulphide, aqueous	saturated	+	+
Potassium sulphite, aqueous	saturated	+	+
Potassium thiosulphate, aqueous	saturated	+	+
Precipitation naphtha DIN 51635		+	/
Propan-2-ol	technical	+	+
Propan-2-ol		+	+
Propane, gaseous	technical	+	
Propanol (propylalcohol)		+	+
Propargyl alcohol, aqueous	7%	+	+
Propionic acid, aqueous	each	+	+
Propylene dichloride	100%	–	
Propylene glycol		+	+
Propylene oxide		+	+
Pseudo-cumene		/	/
Pyridine		+	/
Quinine		+	+
Release agent		+	+
Roasting gas, dry	each	+	+
Rock oil		+	/
Rubber dispersions (latex)		+	+
Sagrotan®		+	/
Salicylic acid		+	+
Salt brine	saturated	+	+
Saturated steam condensate		+	+
Sauerkraut		+	+
Sea water		+	+
Silicic acid, aqueous	each	+	+
Silicone emulsion	commercial	+	+
Silicone oil	technical	+	+
Silver nitrate		+	+
Silver nitrate, aqueous	each	+	+
Silver salts, aqueous	cold saturated	+	+
Soap solution, aqueous	each	+	+
Soda (sodium carbonate), aqueous	each	+	+
Sodium acetate, aqueous	each	+	+
Sodium benzoate		+	+
Sodium benzoate, aqueous	36%	+	+

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Sodium benzoate, aqueous	each	+	+
Sodium bicarbonate (Sodium hydrogencarbonate), aqueous	saturated	+	+
Sodium bisulphate (sodium hydrogensulphate), aqueous	saturated	+	+
Sodium bisulphite (sodium hydrogensulphite), aqueous	saturated	+	+
Sodium borate		+	+
Sodium bromide		+	+
Sodium carbonate, aqueous	each	+	+
Sodium chlorate, aqueous	saturated	+	+
Sodium cyanide		+	+
Sodium dichromate		+	+
Sodium dodecyl benzol sulphonate		+	+
Sodium ferrous cyanide		+	+
Sodium fluoride		+	+
Sodium hexacyanoferrate (II)		+	+
Sodium hexacyanoferrate (III) (sodium ferrous cyanide), aqueous	saturated	+	+
Sodium hexametaphosphate, aqueous	saturated	+	
Sodium hydrogencarbonate (sodium bicarbonate), aqueous	saturated	+	+
Sodium hydrogensulphate (sodium bisulphate), aqueous	saturated	+	+
Sodium hydrogensulphite (sodium bisulphite), aqueous	saturated	+	+
Sodium hydroxide, aqueous	each	+	+
Sodium hydroxide, solid		+	+
Sodium hypochlorite, aqueous		/	–
Sodium nitrate, aqueous	each	+	+
Sodium nitrite, aqueous	each	+	+
Sodium perborate, aqueous	each	+	/
Sodium perchlorate, aqueous	each	+	+
Sodium peroxide, aqueous	10%	+	+
Sodium peroxide, aqueous	saturated	/	
Sodium phosphate		+	+
Sodium phosphate, aqueous	saturated	+	+
Sodium silicate, aqueous	each	+	+
Sodium sulphate, aqueous	cold saturated	+	+
Sodium sulphide, aqueous	saturated	+	+
Sodium sulphide, aqueous	each	+	+
Sodium tetraborate (Borax), aqueous	saturated	+	+
Sodium thiosulphate, aqueous	saturated	+	+
Soft soap		+	+
Softener		+	/
Solvent naphtha	technical	+	/
Soy oil		+	+
Spermaceti wax		+	/
Spindle oil		+ to /	/
Spirit		+	+
Spirit of wine		+	
Spirits		+	
Stain	used concentration	+	+ to /

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Stain remover		+ to /	/
Starch gum (Dextrin), aqueous	18%	+	+
Starch syrup		+	+
Starch, aqueous	each	+	+
Stearic acid		+	/
Styrene		/	–
Succinic acid, aqueous	50%	+	+
Sugar syrup		+	+
Sugar-beet juice		+	+
Sulfuryl chloride (sulfonyl chloride)		–	
Sulphates, aqueous solutions	each	+	+
Sulphur		+	+
Sulphur dioxide, aqueous	each	+	+
Sulphur dioxide, gaseous		+	+
Sulphur ether (diethyl ether)		+ to /	/*
Sulphuric Acid Dichromate	conc.	–	
Sulphuric acid, aqueous	up to 50%	+	+
Sulphuric acid, aqueous	70%	+	+
Sulphuric acid, aqueous	80%	+	+
Sulphuric acid, aqueous	98%	/	–
Sulphuric trioxide		–	
Sulphurous acid		+	+
Tallow	technical	+	+
Tannic acid, aqueous	10%	+	+
Tanning extracts, vegetable	commercial	+	
Tartaric acid, aqueous	each	+	+
Tetrabromomethane		/ to –	–
Tetrachloroethane		/ to –	–
Tetrachloroethylene		/ to –	–
Tetrachloromethane (carbon tetrachloride)	technical	/	–
Tetraethyl lead		+	
Tetrahydrofuran	technical	/ to –	–
Tetrahydronaphthaline (Tetralin®)	technical	+	–
Thioglycollic acid		+	+
Thionyl chloride		–	
Thiophene		/	–
Tin(II) chloride, aqueous	each	+	+
Tin(IV) chloride, aqueous	saturated	+	+
Tincture of iodine	commercial	+	/V
Toluene	technical	/	–
Toluic acid (methylbenzoic acid)	saturated	/	
Tomato juice		+	+
Transformer oil (insulating oil)	technical	+	/
Tri-ß-chlorethyl phosphate		+	+
Tributylphosphate		+	+
Trichloroacetaldehyde (Chloral)	technical	+	+

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Trichloroacetic acid	technical	+	/ to –
Trichloroacetic acid, aqueous	50%	+	+
Trichlorobenzene		–	–
Trichloroethylene	technical	+ to /	–
Tricresyl phosphate		+	+
Triethanolamine		+	+V
Triethanolamine (2,2',2"-nitrilo triethanol), aqueous	saturated	+	/
Triethylene glycol		+	+
Trilon®		+	+
Trimethyl borate		+	/ to –
Trimethylolpropane, aqueous		+	+
Trioctylphosphate		+	/
Turpentine	technical	+ to /	/
Tutogen® U		+	+
Tween® 20 and 80		+	–
Two-cycle oil		+	/
Under chlorous acid		+ to /	/
Urea, aqueous	up to 33%	+	+
Uric acid		+	+
Urine		+	+
Vaseline	technical	+ to /	/
Vinegar (grape vinegar)	commercial	+	+
Vinyl acetate		+	+
Vinylidene chloride (1,1-dichloroethylene)	technical	–	
Viscose spinning solution		+	+
Vitamin C		+	
Vitamin preparations, dry (powder)		+	
Walnut oil		+	/
Washing powder, synthetic	used concentration	+	+
Waste gases containing carbon dioxide	each	+	+
Waste gases containing carbon monoxide	each	+	+
Waste gases containing carbonic acid	each	+	+
Waste gases containing hydrochloric acid	each	+	+
Waste gases containing hydrofluoric acid	traces	+	+
Waste gases containing nitrogen oxide	traces	+	+
Waste gases containing SO2	low	+	+
Waste gases containing sulphur trioxide (oleum)	traces	–	
Waste gases containing sulphuric acid (moist)	each	+	+
Water glass		+	+
Water, distilled		+	+
Wax		+	+ to /
Wax emulsions	commercial	+	/
Waxy alcohol	technical	/	/
Whey		+	+
Whisky		+	
White oil	technical	+ to /	/

Substance	Concentration	The behaviour of GUR and GHR at	
		20 °C	60 °C
Wine		+	
Wine vinegar (table vinegar)	commercial	+	+
Xylol		/	–
Yeast		+	+
Zinc carbonate		+	+
Zinc chloride, aqueous	each	+	+
Zinc oxide		+	+
Zinc salts, aqueous	each	+	+
Zinc sludge		+	+
Zinc stearate		+	+
Zinc sulphate, aqueous	each	+	+

LITERATURE

[1] DIN ISO 175, DIN 53 756, DIN 16 888 Part 1, DIN 16889 Part 1, DIN 8075 Supplement No. 1, DIN 8078 Supplement No. 1

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