

Chemicals used in metal technology, molecular groups, pH value

Important chemicals used in metal technology				
Technical designation	Chemical designation	Formula	Properties	Use
Acetone	Acetone (propanone)	(CH ₃) ₂ CO	Colourless, combustible, lightly volatile liquid	Solvents for paints, acetylene and plastics
Acetylene	Acetylene, Ethane	C ₂ H ₂	Highly reactive, colourless gas, highly explosive	Fuel gas for welding, raw material for plastics
Aqueous cleaner	Various surfactants	--COO-- --OSO ₃ -- --SO ₃ --	Various water-soluble substances	Solvent, cleaning agent; emulsifying and thickening agent
Carbon tetrachloride	Carbon tetrachloride	CCl ₄	Colourless, non-combustible liquid, health-hazardous	Solvent for fats, oils and paints
Carbonic acid	Carbon dioxide	CO ₂	Water soluble, non-combustible gas, solidifies at -78°C	Inert gas for metal active gas welding, dry ice as refrigerant
Cold cleaner	Organic solvent	C _n H _{2n+2}	Colourless, sometimes highly combustible liquids	Solvent for fats and oils, cleaning agent
Copper vitriol	Copper sulphate	CuSO ₄	Blue, water soluble crystal, moderately toxic	Electroplating baths, pest control, for scribing
Corundum	Aluminium oxide	Al ₂ O ₃	Very hard, colourless crystals, melting point 2050°C	Abrasive and polishing agent, oxide ceramic materials
Ethyl alcohol	Ethyl alcohol, denatured	C ₂ H ₅ OH	Colourless, highly combustible liquid, boiling point 78°C	Solvent, cleaning agent, for heating purposes, fuel additive
Hydrochloric acid	Hydrogen chloride	HCl	Colourless, pungent smelling, strong acid	Etching and pickling of metals, manufacture of chemicals
Nitric acid	Nitric acid	HNO ₃	Very strong acid, dissolves metals (except precious metals)	Etching and pickling of metals, manufacture of chemicals
Soda	Sodium carbonate	Na ₂ CO ₃	Colourless crystals, slightly water soluble, basic effect	Degreasing and cleaning baths, water softening
Spirits of ammonia	Ammonium hydroxide	NH ₄ OH	Colourless, pungent smelling liquid, weak lye	Cleaning agent (fat solvent), neutralisation of acids
Sulphuric acid	Sulphuric acid	H ₂ SO ₄	Colourless, oily, odourless liquid, strong acid	Pickling of metals, electroplating baths, accumulators
Table salt	Sodium chloride	NaCl	Colourless, crystalline salt, slightly water soluble	Condiment, for freezing mixtures, for chlorine extraction

MS

Frequently occurring molecular groups				
Molecular group Designation	Formula	Description	Example	
			Designation	Formula
Carbide	≡ C	Carbon compounds; to some extent very hard	Silicon carbide	SiC
Carbonate	= CO ₃	Compounds of carbonic acid, addition of heat yields CO ₂	Calcium carbonate	CaCO ₃
Chloride	- Cl	Salts of the hydrochloric acids; usu. dissolve readily in water	Sodium chloride	NaCl
Hydroxide	- OH	Hydroxides are produced from metal oxides and water; behave as basics	Calcium hydroxide	Ca(OH) ₂
Nitrate	- NO ₃	Salts of the nitric acids; usu. dissolve readily in water	Potassium nitrate	KNO ₃
Nitride	≡ N	Nitrogen compounds; some of them are very hard	Silicone nitride	SiN
Oxide	= O	Oxygen compounds; most commonly occurring molecular group on earth, monoxide (O), dioxide (O ₂)	Aluminium oxide	Al ₂ O ₃
Sulphate	= SO ₄	Salts of the sulphuric acids; usu. dissolve readily in water	Copper sulphate	CuSO ₄
Sulphide	= S	Sulphur compounds; important ores, chip breaker in free cutting steels	Iron(II) sulphide	FeS

pH value															
Type of aqueous solution	← increasingly acidic						neu-tral	increasingly basic →							
pH value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Concentration H ⁺ in mol/l	10 ⁰	10 ⁻¹	10 ⁻²	10 ⁻³	10 ⁻⁴	10 ⁻⁵	10 ⁻⁶	10 ⁻⁷	10 ⁻⁸	10 ⁻⁹	10 ⁻¹⁰	10 ⁻¹¹	10 ⁻¹²	10 ⁻¹³	10 ⁻¹⁴