Common Chemicals Used in the PWB Industry

TECHNICAL BULLETIN TB-9415

These chemicals are commonly used in the PWB industry. This is meant only as a basic spelling and usage guide.

ACIDS	FORMULA	MAJOR APPLICATIONS
Boric	H_3BO_3	Buffer for nickel (Ni) and Solder (SnPb) plating baths. Suppresses the formation of aggressive HF in Fluoboric solder baths.
Fluoboric	HBF_4	Preplate solder cleaner; provides solder bath conductivity.
Hydrochloric	HCl	Electroless copper activator; copper oxide cleaner; cupric chloride etchant a.k.a.:muriatic.
Citric	$C_6H_8O_7$	Organic acid. Mild antitarnish.
Nitric	HNO_3	Plating rack stripper; pH probe cleaner; solder strippers.
Phosphoric	H_3PO_4	Antitarnish component; preplate soak cleaners.
Sulfuric	H_2SO_4	Preplate cleaning/neutralization; copper sulfate bath conductivity.
Hydrofluoric	HF	(Unwanted) decomposition product in fluoboric solder baths. Attacks dry film resist.
Methanesulfonic	CH_3SO_3H	Acid in non-fluoboric tin/lead bath.
Chromic	H_2CrO_4 ($H_2Cr_2O_7$)	• Used to activate plastics for metallization • Used to produce "chromate conversion coatings" on copper foil.

ALKALI (BASES)	FORMULA	MAJOR APPLICATIONS
Monoethanolamine	MEA*	Proprietary "aqueous" strippers.
Potassium Carbonate	K_2CO_3	Aqueous development a.k.a.: potash
Potassium Hydroxide	KOH	Aqueous stripping. a.k.a.: caustic potash
Sodium Carbonate	Na_2CO_3	Aqueous development (anhydrous form).a.k.a.: soda ash
Sodium Hydroxide	NaOH	Aqueous stripping; waste treatment; electroless copper. a.k.a.: caustic soda
Tetramethyl-ammonium Hydroxide	TMAH*	Proprietary "aqueous" strippers
Choline Base	$N(CH_3)_3$ C2H_4OH	Proprietary "aqueous" strippers
Ammonium Hydroxide	NH_4OH	Diazo phototool development; semi-aqueous strippers; alkaline (ammoniacal) etchants.

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SALTS/OXIDES	FORMULA	MAJOR APPLICATIONS
Aluminum Oxide	Al_2O_3	Abrasive particles for jet and brush prelamination scrubbers.
Calcium Carbonate	$CaCO_3$	Hard water deposits in developers and strippers; water hardness typically expressed in ppm of $CaCO_3$. a.k.a.: limestone
Copper Sulfate	$CuSO_4$	Acid copper plating bath's source of ions; generic for acid copper.
Cupric Chloride	$CuCl_2$	Acid etchant for P&E and T&E
Ferric Chloride	$FeCl_3$	Acid etchant for photochemical machining.
Ammonium Chloride	NH_4Cl	Alkaline etchant replenisher
Magnesium Sulfate	$MgSO_4$	Additive to increase soft water hardness (i.e. development rinsing)
Silicon Carbide	SiC	Abrasive grit in brushes
Silicon Dioxide	SiO_2	Major component of pumice (abrasive particles for jet and brush prelamination scrubbers). a.k.a.: silica; sand.
Copper Oxide	$Cu_xO.H_2O$	Usually a mixture of Cuprous Oxide (Cu_2O) and Cupric Oxide (CuO), usually hydrated. Forms as "tarnish" on freshly cleaned copper. Deliberately produced on copper surfaces as multilayer bonder.
Potassium-permanganate	$KMnO_4$	Desmear

SOLVENTS	FORMULA	MAJOR APPLICATION
Acetone	CH_3COCH_3	Surface cleaner to remove organics.
Methylethylketone	MEK*	Coating solvent for dry film manufacture. Surface cleaner to remove organics. Coating solvent for dry film manufacture.
Butyl Carbitol**	EGMBE*	Semi-aqueous strippers. a.k.a.: ethylene glycol monobutyl ether.
Isopropylalcohol	IPA*	Surface cleaner (removal of organics). a.k.a.: rubbing alcohol
Polyethyleneglycol	PEG*	Antifoam. Plating bath additive (carrier).
Trichloroethane	CH_3CCl_3	Chlorinated degreaser (1, 1, 1-form). a.k.a.: methyl chloroform

MISCELLANEOUS	FORMULA	MAJOR APPLICATION
Silicones	$(SiOR_2)n$	Various polymeric organic silicon compounds. Used in oils, lubricants, seals, antifoams. (Not to be confused with the non -metallic element silicon).
Silanes	$RSi(OH)_3$	Various organic silicon compounds. Used as "coupling agents" between glass fibers and epoxy or copper and organics. Also used as antitarnish or adhesion promoter on copper foils
Benzotriazoles	$C_6H_5N_3$	A family or organic heterocyclic compounds containing a 3-nitrogen ring. Used as antitarnish and adhesion promoters.
Imidazoles	C_3H4N_2	A family of organic heterocyclic compounds containing a 2-nitrogen ring. Used as antitarnish and as organic protective coating on copper to preserve solderability.
Formaldehyde	HCHO	Reducing agent in electroless baths. Bacteriostat (solution: formalin).
Cyanide	CN-	Complexing agent to solubilize gold. Copper stabilizer in electroless baths. Highly toxic.

NOTES: *Common abbreviation, not chemical formula. **Union Carbide tradename.

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