

# 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 <sub>3</sub> BO <sub>3</sub>	Buffer for nickel (Ni) and Solder (SnPb) plating baths. Suppresses the formation of aggressive HF in Fluoboric solder baths.
Fluoboric	HBF <sub>4</sub>	Preplate solder cleaner; provides solder bath conductivity.
Hydrochloric	HCl	Electroless copper activator; copper oxide cleaner; cupric chloride etchant a.k.a.:muriatic.
Citric	C <sub>6</sub> H <sub>8</sub> O <sub>7</sub>	Organic acid. Mild antitarnish.
Nitric	HNO <sub>3</sub>	Plating rack stripper; pH probe cleaner; solder strippers.
Phosphoric	H <sub>3</sub> PO <sub>4</sub>	Antitarnish component; preplate soak cleaners.
Sulfuric	H <sub>2</sub> SO <sub>4</sub>	Preplate cleaning/neutralization; copper sulfate bath conductivity.
Hydrofluoric	HF	(Unwanted) decomposition product in fluoboric solder baths. Attacks dry film resist.
Methanesulfonic	CH <sub>3</sub> SO <sub>3</sub> H	Acid in non-fluoboric tin/lead bath.
Chromic	H <sub>2</sub> CrO <sub>4</sub> (H <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> )	<ul style="list-style-type: none"> <li>• Used to activate plastics for metallization</li> <li>• Used to produce "chromate conversion coatings" on copper foil.</li> </ul>

ALKALI (BASES)	FORMULA	MAJOR APPLICATIONS
Monoethanolamine	MEA*	Proprietary "aqueous" strippers.
Potassium Carbonate	K <sub>2</sub> CO <sub>3</sub>	Aqueous development a.k.a.: potash
Potassium Hydroxide	KOH	Aqueous stripping. a.k.a.: caustic potash
Sodium Carbonate	Na <sub>2</sub> CO <sub>3</sub>	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 <sub>3</sub> ) <sub>3</sub> C <sub>2</sub> H <sub>4</sub> OH	Proprietary "aqueous" strippers
Ammonium Hydroxide	NH <sub>4</sub> OH	Diazo phototool development; semi-aqueous strippers; alkaline (ammoniacal) etchants.



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SALTS/OXIDES	FORMULA	MAJOR APPLICATIONS
Aluminum Oxide	Al <sub>2</sub> O <sub>3</sub>	Abrasive particles for jet and brush prelamination scrubbers.
Calcium Carbonate	CaCO <sub>3</sub>	Hard water deposits in developers and strippers; water hardness typically expressed in ppm of CaCO <sub>3</sub> . a.k.a.: limestone
Copper Sulfate	CuSO <sub>4</sub>	Acid copper plating bath's source of ions; generic for acid copper.
Cupric Chloride	CuCl <sub>2</sub>	Acid etchant for P&E and T&E
Ferric Chloride	FeCl <sub>3</sub>	Acid etchant for photochemical machining.
Ammonium Chloride	NH <sub>4</sub> Cl	Alkaline etchant replenisher
Magnesium Sulfate	MgSO <sub>4</sub>	Additive to increase soft water hardness (i.e. development rinsing)
Silicon Carbide	SiC	Abrasive grit in brushes
Silicon Dioxide	SiO <sub>2</sub>	Major component of pumice (abrasive particles for jet and brush prelamination scrubbers). a.k.a.: silica; sand.
Copper Oxide	Cu <sub>x</sub> O.H <sub>2</sub> O	Usually a mixture of Cuprous Oxide (Cu <sub>2</sub> O) and Cupric Oxide (CuO), usually hydrated. Forms as "tarnish" on freshly cleaned copper. Deliberately produced on copper surfaces as multilayer bonder.
Potassium-permanganate	KMnO <sub>4</sub>	Desmear

SOLVENTS	FORMULA	MAJOR APPLICATION
Acetone	CH <sub>3</sub> COCH <sub>3</sub>	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 <sub>3</sub> CCl <sub>3</sub>	Chlorinated degreaser (1, 1, 1-form). a.k.a.: methyl chloroform

MISCELLANEOUS	FORMULA	MAJOR APPLICATION
Silicones	(SiOR <sub>2</sub> ) <sub>n</sub>	Various polymeric organic silicon compounds. Used in oils, lubricants, seals, antifoams. (Not to be confused with the non-metallic element silicon).
Silanes	RSi(OH) <sub>3</sub>	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 <sub>6</sub> H <sub>5</sub> N <sub>3</sub>	A family of organic heterocyclic compounds containing a 3-nitrogen ring. Used as antitarnish and adhesion promoters.
Imidazoles	C <sub>3</sub> H <sub>4</sub> N <sub>2</sub>	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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