

Cupric Etch Bath Development

References suggest: 260 to 370 gpl CuCl₂ (MW 134.45) or about 1.93 to 2.75 M.
S.G., 1.22 to 1.38
Free acid: 1 to 2 N HCl

Targets: 2.5 M Cu(II)
2N Cl excess

Per liter calculations:



CuO (MW 79.54) 198.9 g (2.5 moles)
7 moles HCl (solution was 20°Baume, 31.45 % w/w ~10N; needed 700 mL)
water q.s. 1000 mL

Per 800 mL calculations (as made, 01.06.09):

159.1 g CuO (2 mole)
500 mL HCl (5 mole)(NB: final calculated free acid 1 mole/800 mL = 1.25 M)
water q.s. 800 mL

Did not measure S.G. initially. After one use to etch 3 sq. in. of 1 oz. copper (0.62 g, 11.7 mmole), S.G. was 1.285 by battery hydrometer and 1.270 by repetitive (X4) measurements of 5 mL (6.35 to 6.36 g) (1.2% difference). Hygrometer read a little high.

There was a magnetic, very fine, black residue in the flask removed by stir bar. Unknown composition. Cannot estimate weight accurately, as it was very fine particulate, possible an iron or nickel salt, about 1 to 2 gm.

TRIAL USE

Started etching 1x3" PCB of 1 oz copper. At RT, etch rate was very slow. Started heating and at 35 to 40 °C rate was much faster. Total time was 21 minutes; time at 35 to 40 °C was 11 minutes. Etch was very nice. Etch solution took on a very slight yellow cast compared to the brilliant green before use. Just used stirring.

Ferric chloride (old solution with citric acid added and bubbled with air to get rid of sludge) took 21 minutes at 35 to 40°C. There was no difference in the quality of the etching.