UCDAVIS
COLLEGE OF ENGINEERING
Center for Nano-MicroManufacturing

SulphoNitric

Process:
SulphoNitric for cleaning, etch and surface preparation.

Materials:
Sulphuric Acid (98% wt), and Nitric Acid (70% wt), mixed in a 3:1 ratio by volume. Typically heated.

Incompatible Materials:
No Solvents or liquid organics, which very frequently form explosives in SulphoNitric. Use caution as many other incompatibles exist. Watch for splattering and thermal 'run away' when etching metals, combustibles, or oxidizable materials. The first sign of a runaway is an unexpected increase in bubbling, whence you should remove your sample. Both Teflon and Pyrex beakers are suitable for use with unheated SulphoNitric, though only Pyrex can be used on hotplates.

Hazards:
Has many dangerous incompatibles. Highly destructive on contact with human tissues. Solution bubbles and produces toxic brown Nitrogen Dioxide fumes from decomposition. SulphoNitric heats upon mixing and is typically boiled during use. When simmering or boiling, SulphoNitric creates fumes and steam which entrains Sulphuric acid and creates widespread and long-lasting hazardous residues. Expect considerable heating if mixing SulphoNitric into a spent chemical accumulation bottle, and never tightly cap bottles as pressurization and explosion will occur.

Exposure Actions: Do what's below, and then notify CNM2 staff within a few hours. For advice, call CNM2 staff.
Eyes: Hold eyes open in running eyewash station for 15 minutes and call 911 as soon as possible.
Skin: Remove splashed clothing, wash for 15 minutes and seek medical aid if irritation persists.

Personal Protective Equipment:
Goggles, face shield, heavy chemical gloves (blue disposable Nitridex)[1], and heavy chemical apron. Boiling SulphoNitric in particular leaves many hazardous residues, so rinse gloves often.

Acceptable Locations For Use:
Wet process stations 3, 9, 12 acid & base fume hood[2]. If heated, only acid & base fume hood.

Additional Process Notes:
Measure Sulphuric Acid, pour in Nitric Acid and stir[3]. Heat only after mixing is complete if greater than ambient temperature is desired[4] to avoid spatter. Never tightly cap bottles of spent SulphoNitric, which risks explosion. Clean the process station fastidiously after use to protect the next user. Also, be careful not to confuse SulphoNitric with Piranha and dispose in the wrong bottle- toxic brown Nitrogen Dioxide may erupt out as a result.

Disposal: Allow to cool, then decant or aspirate to neutralizer. Heavy metal bearing solutions should instead be disposed of in the "Persistently Oxidizing Acids" bottle. To avoid a waste bottle explosion, always use a venting cap or leave the cap ¼ to ½ turn from tight.

*Additional SOPs available, see: 1. PPE Choice and Cleaning 2. Work Station Cleaning 3. Pouring and Mixing 4. Hotplates 5. Haz Waste Management