

BOE: Buffered Oxide Etch

Process:

Highly toxic mixture for etching Silicon Oxide with high selectivity to photoresist.

Materials:

Ammonium Fluoride, Hydrofluoric Acid and water for dilution, typically premixed.

Incompatible Materials:

Will slowly dissolve glassware. Mixing with acids will cause toxic HF outgassing. Though not dangerous, metals will contaminate bath.

Hazards:

Poor warning properties: harmful exposure and workstation contamination are initially very difficult to detect. Highly Toxic and acutely harmful to nerves/bones. BOE is a skin penetrant and numbs the skin, so burns are typically not apparent until a day later. Watch very carefully for splashes because this anesthetic effect will prevent you from feeling the burn and reacting appropriately. Fumes are much less prevalent than Hydrofluoric Acid fumes, but still harmful. pH paper will not distinguish BOE from NCNC's DI water; both have pH roughly 6, causing 'no change' on NCNC's pH strips. This makes BOE spills very hard to detect, so treat unknown 'water' as BOE when working at plenums with a BOE or RCA bath.

Exposure Actions: Do what's below, and then notify NCNC staff within a few hours. For advice, call NCNC 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 3 minutes, apply Calcium Gluconate gel and call 911.

Personal Protective Equipment:

Goggles, face shield, heavy chemical gloves (blue disposable Nitridex or black Chemtek)¹, and heavy chemical apron. BOE leaves persistent residues, so rinse gloves often. Keep Calcium Gluconate gel handy.

Acceptable Locations For Use:

Wet process stations 2, 3, 11, 13, acid & base fume hood². If hotter than a simmer, only acid & base fume hood.

Additional Process Notes:

Never leave a BOE bath unlabeled, as it is toxic and nearly indistinguishable from DI water. If dilution is needed measure water, add BOE, then stir³. It's very rare to heat BOE, though if you do, expect the fume hazard to approach that of room temperature HF^{4,5}. BOE is transparent when wet so be sure to rinse your work station after use². Its residues form toxic, persistent white crystals when dry.

Disposal:

If heated allow to cool, then decant or aspirate to neutralizer. Heavy metal or organic bearing solutions should instead be disposed of in spent the "Fluorides" bottle⁶.

*Additional SOPs available, see: 1. PPE Choice and Cleaning
5. Hydrofluoric Acid

2. Work Station Cleaning
6. Haz Waste Management

3. Pouring and Mixing

4. Hotplates