UCDAVIS
COLLEGE OF ENGINEERING
Center for Nano-MicroManufacturing

Pouring and Mixing

Pouring

Materials:
Bottled chemicals, typically in the 1gallon plastic bottles provided by NCNC.

Incompatible Materials:
Refer to chemical specific SOPs.

Hazards, Exposure Actions and PPE:
Refer to chemical specific SOPs. Pouring water into concentrated acid or bases will often cause splattering and fumes. Chemicals with vapor hazards are somewhat more hazardous as they are being poured. Pouring with the bottle's base out over your feet (instead of over the plenum) invites stray drips to splash on your poorly protected legs.

Acceptable Locations For Use:
Refer to chemical specific SOPs.

Additional Process Notes:
If your chemical bottle is nearly empty after pouring, discard the rest and rinse it clean[1].

Whenever possible, pour chemicals where you intend to use the bath. When pouring into a waste bottle, put the waste bottle in a sink and use a funnel to help. To pour, use two hands to hold the bottle, typically one at the bottle's neck and the other at its base. To prevent splattering, try not to let the chemical glug out as you pour, instead pour slowly enough that the chemical comes out in one steady stream. Make certain the bottle's base hangs over the bench as you pour, and not over your feet. Should the bottle dribble and drip it is much better to drip on the bench than on your feet.

After pouring a photoresist, clean off the bottle's threads using tekwipes dampened with acetone. These tekwipes can typically be discarded in normal trash. After pouring a concentrated acid, base or oxidizer, cap the bottle and briefly rinse off the outside of the bottle with DI water to remove any hazardous material that dribbled down the side of the bottle while pouring. After rinsing, briefly dry the bottle so others don't mistake the wet bottle for a chemical leak. Alternatively, if careful inspection reveals that no chemical dripped on the bottle while pouring, you can skip rinsing.

*Additional SOPs available, see: 1. Haz Waste Management

Mixing

Materials:
Chemicals to be mixed.

Incompatible Materials:
Refer to chemical specific SOPs. However, in general avoid mixing chemicals from these different classes: Oxidizers, Organics (reducers), Acids and Bases. Some mixtures will create heat, toxic gasses, or explosives.

Hazards, Exposure Actions and PPE:
Refer to chemical specific SOPs. Mixing compatible chemicals correctly creates little additional hazard. Mixing acids and bases creates heat and can splatter chemicals from floor to ceiling. Mixing oxidizers and organics can form explosive solids or highly flammable liquids. Mixing oxidizers with acids or bases often powerfully amplifies the oxidizer's reactivity and creates toxic gasses and explosives. Mixing organics with acids or bases occasionally makes 'condensate' gunk. Many of these mixtures are dangerous, but still used in the cleanroom.

Acceptable Locations For Use:
Refer to chemical specific SOPs.

Additional Process Notes:
If your chemical bottle is nearly empty after pouring, discard the rest and rinse it clean[1].
Mixing Solids into liquids: To avoid clumping and promote dissolution, mix a small amount of liquid into the solid and stir vigorously; then pour the solution into the rest of the liquid and stir again.

Mixing liquids: When mixing concentrated (>10%) aqueous chemicals (such as acids, bases and oxidizers), always pour the more concentrated solution into the less concentrated one to avoid splattering. This common rule has two convenient mnemonics:

1) (AAA) Always Add Acid to water.
2) (Boston Accent) Do as you oughta add acid to watta.

Though we suggest you always follow this rule, some institutions instead suggest mixing less concentrated oxidizers into more concentrated acids. The concentrations of chemicals provided by NCNC allow either order of mixing.

After pouring the liquids together, stir for about 20 seconds with an appropriate stir rod (Teflon is always acceptable). Mixing concentrated solutions takes longer than most people expect, especially when mixing water with 'oily' liquids, such as Potassium Hydroxide, Acetic Acid or Sulphuric Acid. Also, expect the solutions to exotherm (heat up) upon mixing.

Typically, no special rules need to be followed when mixing organics with organics.