



## SAFETY LESSONS LEARNED SODIUM METAL & DMC FIRE INCIDENT

### What happened?

Monday morning an undergraduate researcher noticed an unusual smell and fire in a partially closed fume hood used by the group for hazardous waste storage. Together with the second student present in the laboratory they gathered belongings and evacuated the building. The fire alarm then sounded and the sprinkler head nearest to the fume hood activated, extinguishing the fire. By the time of firefighters' arrival, the laboratory was soaked in water that tested slightly acidic. The fire was complicated by a variety of fluoride releasing chemicals (LiPF<sub>6</sub>, HF etc.) historically used in the laboratory, thus level A response was ordered. After the lab was tested negative for fluoride, UCSB Hazmat responders were able to clean the lab.

### Hazardous Waste Contents Specifications

Hazardous waste in the fume hood consisted of metallic Na usually kept in paraffin oil. Li metal was quenched in the named fume hood before disposal. A variety of carbonate esters, mostly dimethyl carbonate, were also present. In addition, solid and liquid waste containing HF, LiPF<sub>6</sub>, LiF, NaF.

Dimethyl carbonate vapors are highly flammable, heavier than air and notorious for their ability to flash back to the source. Sodium and lithium metals are water reactive and can produce sparks serving as source of the ignition.

### Injury and damages

No injuries were sustained. Fume hood destroyed.

### Contributing Factors

The hazardous waste bottles were mostly plastic due to incompatibility of fluoride containing waste with glass. All hazardous waste bottles were in plastic secondary containers. Lots of plastic contributed to propagation of the fire.

Hand propelled Class D fire extinguisher was not readily available.

### Corrective Actions

1. Hands on fire extinguisher refresher training for the group. \*\*Note this is now mandatory for certain groups.
2. Emphasis on the importance of chemical segregation in the lab. Three main hazardous waste streams (flammable, pyrophoric/water reactive, and oxidizing/acidic) waste shall be stored in different fume hoods in secondary containers.
3. EHS to perform hazardous waste pickup from the lab on at least a biweekly schedule (to be initiated by the lab group/PI)
4. Revision of related SOPs with the specification of segregation of incompatible chemicals and processes.
5. Addition of class D fire extinguishing media to all fume hoods containing pyrophoric/water reactive, and combustible metals.

