Required Training

UC Lab Safety Fundamentals

Required PPE

Lab coat, safety glasses/goggles, nitrile gloves

Equipment

Spiral glass setup with funnel and collection flask

Chemicals

100 mL Solution A (for 1 L solution)

- 4.0 g sodium carbonate (anhydrous), Na$_2$CO$_3$
- 0.2 g Luminol (3-aminophthalhydrazide), C$_8$H$_7$O$_2$N$_3$
- 24.0 g sodium bicarbonate, NaHCO$_3$
- 0.5 g ammonium carbonate monohydrate, (NH$_4$)$_2$CO$_3$•H$_2$O
- 0.4 g copper (II) sulfate pentahydrate, CuSO$_4$•5H$_2$O
  or 0.25 g Copper (II) chloride dihydrate, CuCl$_2$•2H$_2$O

100 mL Solution B

- 5 mL 30% hydrogen peroxide, H$_2$O$_2$, diluted to 1 L with water

Note: Any problems are most likely due to H$_2$O$_2$. Make fresh portion of H$_2$O$_2$ and retest before remaking Solution A.

Procedure:

1. Set up the glass spiral apparatus (making sure the receiving flask is in place) and dim the lights.
2. Slowly pour equal amounts of solutions A and B into the funnel. Make sure the total volume does not exceed the capacity of the receiving flask.
3. A strong blue glow will be observed. The glow will last ~2 min after mixing.
4. Alternatively, wear gloves and soak a piece of cotton in about 100 mL of solution A. In the dark, immerse the cotton in about 100 mL of solution B and wring out the solution. The cotton will glow and “drip fire”.

Discussion:
Many chemical reactions release energy in the form of heat. The oxidation of Luminol, however, instead releases energy in the form of light. Luminol is oxidized by hydrogen peroxide producing an amino phthalate derivative, which is in an excited state. The luminol derivative is then reduced to a lower energy state, emitting energy (light) in the process (chemiluminescence).

**Hazards:**

Copper compounds are harmful if taken internally and dust from these compounds can irritate mucous membranes.

Toxicity and carcinogenic properties of luminal are not known.

**SOP:**

Peroxide Compound – Hydrogen Peroxide

Strong Oxidizer – Hydrogen Peroxide

**Disposal (by Storeroom)**

Be sure to flush the glass apparatus with distilled water to rinse out remaining solution. Collect all waste and submit to EH&S