

The Silver Mirror

Purpose

To demonstrate an oxidation-reduction reaction that effectively illustrates the reduction of silver ions to silver metal

Materials

100 mL graduated cylinder	dextrose
250 mL Erlenmeyer flask	fructose
500 mL Florence flask	silver nitrate
3 150 mL beakers	ammonium nitrate
50 mL beaker	tartaric acid
sodium hydroxide	ethanol
heating unit	

Solution A: Dissolve 2.5 grams of dextrose and 2.5 grams of fructose in 50 mL of distilled water. Add 0.6 gram of tartaric acid. Bring the solution to a boil, cool it, and pour into a 100 mL graduated cylinder. Add 10 mL of ethanol and dilute to 100 mL.

Solution B: Dissolve 4.0 grams of silver nitrate into 50 mL of H₂O.

Solution C: Dissolve 6.0 grams of ammonium nitrate into 50 mL of H₂O.

Solution D: Dissolve 10 grams of sodium hydroxide in 100 mL of H₂O.

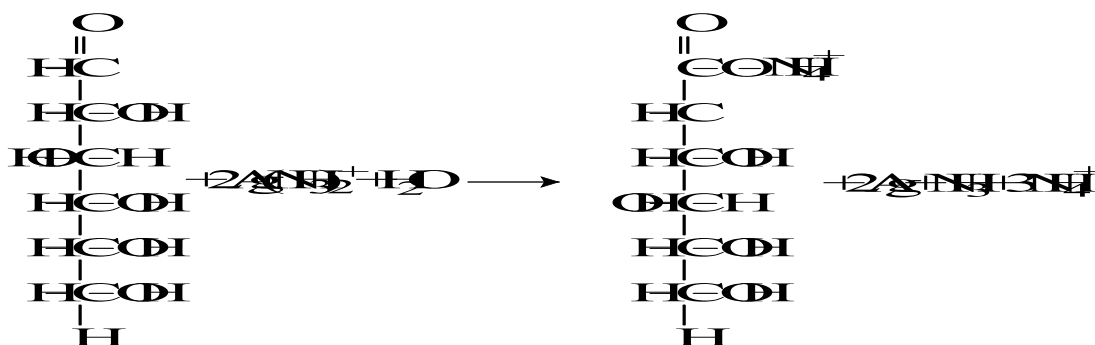
Procedure

1. Clean a 500 mL Florence flask thoroughly.
2. Place 30 mL of Solution A in the flask.
3. Mix 15 mL of Solution B with 15 mL of Solution C in a clean 50 mL beaker and add to the flask - don't mix until 1 hr. before demo. Explosive!
4. Quickly add 30 mL of Solution D to the flask and stopper it.

- Mix the flask with a quick but gentle swirling motion. Be sure to cover the entire glass surface evenly while stirring.
- Continue swirling until the silver mirror forms.
- IMMEDIATELY** pour out the remaining solution down the drain and rinse the silver flask with water. Clean with unconcentrated HNO_3 .

Additional Information

- If the mirror does not form, the flask was probably not clean.
- This reaction is potentially explosive. Do not mix Solution B and Solution C until the demonstration is performed.
- Metallic silver is formed when silver ions oxidize the aldehyde part of the glucose molecule:



Disposal

Excess solutions should be filtered with vacuum filtration allowing the silver to be saved (and later made into silver nitrate solution). Excess fluids should be flushed down the sink with excess water as to prevent the formation of silver azide.

Reference

Summerlin, L. and Ealy, J. Chemical Demonstrations: A Sourcebook for Teachers, 1985