

University of Utah Chemistry Demonstration:

Silver Mirror (Tollens):

Solutions for the experiment:

Solution A: Dissolve 5g of glucose in 50 mL of distilled water. Add 0.6g of tartaric acid. Bring the solution to a boil, then cool. Add 10 mL of ethyl alcohol and dilute to 100 mL with distilled water.

Solution B: Dissolve 4g of silver nitrate in 50 mL of distilled water.

Solution C: Dissolve 6g of ammonium nitrate in 50 mL of distilled water.

Solution D: Dissolve 10g of sodium hydroxide in 100 mL of distilled water.

Instructions:

Prep the above solutions before you leave lab.

Scrupulously clean a 50 mL Erlenmeyer flask (or other glassware being used). Place 10 mL of Solution A in flask. Mix 5 mL of solution B with 5 mL of solution C and add this mixture to the flask. Quickly add 10 mL of solution D to the flask. Stopper the flask and mix with a quick but gentle swirling motion. Cover the entire glass surface evenly with the solution while swirling. After silver mirror has formed, immediately pour the solution down the drain and rinse flask.

Cautions:

The ammoniacal silver solution produced by this reaction is potentially explosive therefore; the following precautions must be taken. Do not mix solution B and solution C until the demonstration is being performed. When the silver mirror forms, IMMEDIATELY flush the solution down the drain and rinse the flask. If no sink it is available we recommend that this experiment is not performed.

Disposal:

Please see Holly Sebahar or anyone else familiar with the process for the first time you attempt to remove the silver mirror from the glassware. You will dissolve the mirror in HNO_3 . HNO_3 is highly corrosive is a strong oxidizing agent.

The Tollens reagent is used to test for the presence of aldehydes. Aldehydes are oxidized to the carboxylic acid and the $[\text{Ag}(\text{NH}_3)_2]^+$ ion is reduced to metallic silver, producing a silver mirror on the inside of the glassware. Ketones will produce a negative result.

SAFETY

Wear gloves for this experiment!

NaOH.....corrosive
Ag..... will leave brown stain on skin
EtOH.....flammable
 HNO_3 (used in cleaning).....highly corrosive
Will burn skin. Strong oxidizing agent.
Incompatible with all organic
compounds. DO NOT DISPOSE OF
IN ORGANIC WASTE.

