

# Create a Silver Christmas Test Tube Ornament

**Introduction** In 1835, German chemist Justus von Liebig invented a process to silver-plate mirrors. In this process, dissolved silver ions ( $\text{Ag}^+$ ) are converted into metallic silver by reducing their charge to zero with a sugar, dextrose. Today, you will be re-enacting this process and producing a silvered test tube which you may keep as a Christmas tree ornament.

**Safety** Sodium hydroxide solution is corrosive to skin and eyes. Wear safety glasses! Silver nitrate solution will stain skin and clothing. Ammonium nitrate solution is toxic by ingestion. Wash your hands after the lab is done. Ammonia vapors will be given off by the reaction. Do not bring the mouth of the test tube close to your face.

## This Procedure Operates like an Assembly Line

### Work with a Partner

### Keep the Workbench Clean

#### Procedure

1. Using a rinse bottle, add a squirt of acetone to the inside of your test tube. Thoroughly rinse the walls of the tube to remove any dust or chemical residue. Dump the acetone into the waste beaker and rinse it down with a squirt of distilled water. Dump the water out in the waste beaker. Allow the test tube to air dry for a few minutes. Do not blow into the test tube!
2. Using a small graduated cylinder labeled silver nitrate, measure 2.5 ml of silver nitrate solution into a small 50-ml beaker.
3. Using a small graduated cylinder labeled ammonium nitrate, measure 2.5 ml of ammonium nitrate solution and place it into the same 50-ml beaker. Swirl to mix the silver nitrate and ammonium nitrate solutions.
4. Using a small graduated cylinder labeled dextrose, measure 5.0 ml of dextrose solution. Place this solution into the test tube, not the beaker.
5. Using a small graduated cylinder labeled sodium hydroxide, measure 5.0 ml of sodium hydroxide solution. **Don't add this to anything yet.**
6. Add the combined silver nitrate/ammonium nitrate solution to the test tube, followed *immediately* by the sodium hydroxide solution.
7. Cover the mouth of the test tube with a piece of Parafilm. Rotate the test tube constantly, so a thin even film of silver coats the inside of the tube.
8. After a silver coating has formed inside the test tube, pour out the liquid into the waste beaker.
9. Rinse your test tube with a squirt of acetone. Allow your test tube to dry for a few minutes.
10. Add a string and you now have a silver test tube Christmas tree ornament!
11. Please clean and dry your small 50-ml beaker and return it to the front of the assembly line.