FLINN SCIENTIFIC

Name_____

Laboratory Report

Circumference of glass ornament	
Mass of ornament	
Mass of silver ornament	

1. Using the measured circumference of the glass ornament, calculate the radius (in cm) and the surface area (cm^2) of the ornament. (The formula for the circumference of a sphere is $2\pi r$.)

2. Calculate the mass and the number of moles of silver lining the inside of the glass ornament.

3. The density of silver is 10.5 g/cm^3. What is the volume of silver metal lining the inside of the glass ornament?

4. Assume that the volume of silver in the ornament can be estimated using the following equation:
Volume = Surface area × thickness. Calculate the approximate thickness of the silver lining in centimeters.

5. Convert the thickness of the silver layer to micrometers (1 μm = 1×10^{-6} m) and also nanometers (1 nm = 1×10^{-9} m).

6. The radius (r) of a silver atom is 160 picometers (1 pm = 1×10^{-12} m). Estimate the thickness of the silver lining in terms of the number (N_{Ag}) of silver atoms. Assume that the thickness is equal to $N_{Ag} \times 2r$. **Hint:** Convert the radius of a silver atom from picometers to centimeters first!

7. Balance the following chemical equation for the formation of Tollens' reagent in this experiment.

$$AgNO_3(aq) + NH_4NO_3(aq) + NaOH(aq) \rightarrow \underset{\textit{Tollens' reagent}}{Ag(NH_3)_2OH(aq)} + NaNO_3(aq) + H_2O(l)$$