FLINN SCIENTIFIC

Name____________________

Silver Ornament Holiday Lab

Data Table

Circumference of glass ornament (cm)	
Mass of ornament ball	
Mass of silver ornament	

Post-Lab Questions

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 (a) the mass and (b) 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 approximated by 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 ($1\ \mu m = 1 \times 10^{-6}$ m) and nanometers ($1\ nm = 1 \times 10^{-9}$ m).

6. The radius (r) of a silver atom is 160 picometers ($1\ pm = 1 \times 10^{-12}$ 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.

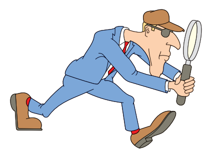
$$AgNO_3 + NH_4NO_3 + NaOH \rightarrow \underbrace{Ag(NH_3)_2OH}_{\textit{Tollens' Reagent}} + NaNO_3 + H_2O$$

Test #7. Ice Test

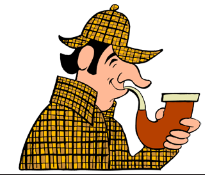
12. Would any of these minerals still melt through the ice if the ice cube had been put in the freezer? Try it!
13. What will go through an ice cube faster, a big piece of mineral or a small piece? Try the experiment!
14. Companies mine thousands of tons of one of these minerals each year to melt snow and ice on roads. Which mineral is it? Explain.
15. Which mineral or minerals would be a good choice to spread on a snowy road to provide traction for a long time?

Test #8. Solubility Test

16. Some buildings and statues are made with limestone. Limestone has a lot of mineral #4 in it. Would you like to live in a house made of limestone if the house was in an area that received a lot of acid rain?
17. Acid rain poisons some lakes. Lakes can be treated by adding limestone that contains a lot of mineral #4 in it. Limestone can neutralize the acid in the lakes. Would water, with limestone dissolved in it, have a pH above or below 7? Why?
18. Which dissolves better in water, sugar or salt? Obtain two beakers of the same size. Fill each ½ full of water. Start adding level spoonfuls of sugar to one beaker, and level spoonfuls of salt to the second beaker. After adding the sugar or salt, stir the water until all of the solid is dissolved. Which dissolves better in water, sugar or salt?
19. Will sugar and salt dissolve in oil? Pour some vegetable oil into a cup. Try dissolving sugar in the vegetable oil. Repeat this test for salt. Does it work as well as the water?
20. Minerals that dissolve in water have bonds between their atoms that can be pulled apart by the water molecules. Based on the water dissolving test, which minerals are held together by bonds that can be pulled apart by water molecules?



Be a Mineral Detective
Observations and Evidence



Place Mineral Sample Below	Mineral Number	Observations (Color, Physical Description)	Light Interaction	Streak	Hardness	Cleavage	Smell	Ice	Solubility in Water	Solubility in Acid
	1									
	2									
	3									
	4									
	5									
	6									
	7									
	8									