

ChemTools HW

1. Pick a problem that you have dealt with and apply the scientific method to that problem. Label each step and then what you did in your problem that corresponded to each step.

2. Pure water freezes at 0°C . A student wanted to test the effect of adding salt to the water. The table shows the data that was collected.

Effect of Salt on Freezing Point of Water	
Salt Added (g)	Freezing Point ($^{\circ}\text{C}$)
5	-4.8
10	-9.7
15	-15.1
20	-15.0

- a. What was the manipulated (independent) variable?
- b. What was the responding (dependent) variable?
- c. Why must the volume of water be the same for each test?
- d. What is one possible explanation for the data obtained for 15 and 20 grams of salt added and their subsequent freezing points?

- e. Based on the data, the student hypothesized, “As more salt is added to water, the temperature of the water decreases.” Is this hypothesis supported by the data? Explain.

3. You are asked to design an experiment to answer the question: “Which paper towel is the best?”
 - a. What is the manipulated (independent) variable in your experiment?

 - b. List three possible responding (independent) variables that could be used to define “best”?

 - c. Pick one of the responding (independent) variables and rewrite the question as a hypothesis.

 - d. List at least five factors that must be kept constant when you test the hypothesis.

4. Hydrogen and oxygen react chemically to form water. How much water would form if 4.8 grams of hydrogen reacted with 38.4 grams of oxygen?

5. When powdered iron is left exposed to the air, it rusts. Explain why the mass of the rust is greater than the mass of the powdered iron.

6. Identify the following 5 substances and fill in any missing information.

Unknown	Density ($\frac{g}{cm^3}$)	Melting Point ($^{\circ}C$)	Boiling Point ($^{\circ}C$)
		1660	-----
			-164
		1535	-----
	2.532		
			-183

7. Which of the following substances will be a liquid at room temperature ($25^{\circ}C$)?

Substance	Melting Point ($^{\circ}C$)	Boiling Point ($^{\circ}C$)
I	26	29
II	21	26
III	21	24
IV	-20	20

8. You experimentally determine that water in Siler City boils at $99.1^{\circ}C$, what is the percent error of this measurement?
9. To sterilize a scalpel, the temperature needs to be kept at $170^{\circ}C$ for 1.5 hours. Convert this temperature to Kelvins.
10. Convert the following units
- 0.044 km to meters
 - 4.6 mg to grams
 - 0.107 g to centigrams

d. 15 cm^3 to liters

e. 7.38 g to kilograms

f. 6.7 cs to milliseconds

g. 94.5 cg to micrograms

11. A shiny piece of metal has a volume of 245 cm^3 and a mass of 612 grams. What is the identity of this metal?

12. The density of silver at 20°C is $10.5 \frac{\text{g}}{\text{cm}^3}$. What would the volume of the silver be if it has a mass of 68 g?

13. A 70 g bar of gold is cut into 3 equal pieces. How does the density of each piece compare to the density of the original gold bar?

14. An object has a volume of 19.7 mL and a mass of 15.8 g. Would this ball sink or float in a container of methanol?

15. A shiny, gold-colored bar of metal weighing 57.3 g has a volume of 4.7 cm^3 . Is the bar of metal pure gold?