

# AP Chemistry

## Chapter 1 Practice Problems

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Period \_\_\_\_\_

1. In each of the following pairs, decide which is an element and which is a compound.

- Na and NaCl
- sugar and carbon
- gold and gold chloride

2. In each case, decide whether the underlined property is a physical or chemical property.

- The normal color of elemental bromine is orange.
- Iron turns to rust in the presence of air and water.
- Hydrogen can explode when ignited in air.
- The density of titanium metal is  $4.5\text{g/cm}^3$
- Tin metal melts at 505K
- Chlorophyll, a plant pigment, is green.

3. Iron pyrite is often called “fool’s gold” because it looks like gold. Suppose you have a solid that looks like gold, but you believe it to be fool’s gold. The sample has a mass of 23.5g. When the sample is lowered into the water in a graduated cylinder, the water level rises from 47.5mL to 52.2mL. Is the sample fool’s gold ( $d = 5.00\text{g/cm}^3$ ) or “real” gold ( $d = 19.3\text{g/cm}^3$ )?

4. A standard U.S. postage stamp is 2.5cm long and 2.1cm wide. What is the area of the stamp in square centimeters? In square meters?

5. You and your lab partner are asked to determine the density of an aluminum bar. The mass is known accurately (to four significant figures). You use a simple metric ruler to determine its size and calculate the results in A. Your partner uses a precision micrometer and obtains the results in B.

<u>Method A (<math>\text{g/cm}^3</math>)</u>	<u>Method B (<math>\text{g/cm}^3</math>)</u>
2.2	2.703
2.3	2.701
2.7	2.705
2.4	5.811

The accepted density of aluminum is  $2.702\text{g/cm}^3$ .

- Calculate the average density for each method. Should all the experimental results be included in your calculations? If not, justify and omissions.
- Calculate the percent error for each method’s average value.
- Which method’s average value is more precise? Which method is more accurate?

6. A piece of turquoise is a blue-green solid, and has a density of  $2.65\text{g/cm}^3$  and a mass of 2.5g.

- Which of these observations are qualitative and which are quantitative?
- Which of these observations are extensive and which are intensive?
- What is the volume of the piece of turquoise?

7. The anesthetic procaine hydrochloride is often used to deaden pain during dental surgery. The compound is packaged as a 10.% solution (by mass;  $d = 1.0\text{g/mL}$ ) in water. If your dentist injects 0.50mL of the solution, what mass of procaine hydrochloride (in milligrams) is injected?

8. Suggest a way to determine whether the colorless liquid in a beaker is water. If it is water, does it contain dissolved salt? How could you discover whether salt is dissolved in the water?

9. What experiment can you use to:

- a. Separate salt from water?
- b. Separate iron filings from small pieces of lead?
- c. Separate elemental sulfur from sugar?

10. Carry out the following operations. Provide the answer with the correct number of significant figures.

- a.  $(1.52)(6.21 \times 10^{-3})$
- b.  $(6.21 \times 10^3) - (5.23 \times 10^2)$
- c.  $(6.21 \times 10^3)/(5.23 \times 10^2)$

11. Carry out the following calculation, and report the answer to the correct number of significant figures.

$$(1.68) \left[ \frac{23.56 - 2.3}{1.248 \times 10^3} \right]$$

12. Diamond has a density of  $3.513 \text{ g/cm}^3$ . The mass of diamonds is often measured in “carats”, where 1 carat equals 0.200g. What is the volume (in cubic centimeters) of a 1.50-carat diamond?

13. The aluminum in a package containing  $75 \text{ ft}^2$  of kitchen foil weighs approximately 12 ounces. Aluminum has a density of  $2.70 \text{ g/cm}^3$ . What is the approximate thickness of the aluminum foil in millimeters? (1oz. = 28.4g)

14. The highest temperature ever recorded in Phoenix, Arizona was  $122^\circ\text{F}$ . Express this in  $^\circ\text{C}$ .

15. A student finds that the weight of an empty beaker is 12.024g. She places a solid in the beaker to give a combined mass of 12.108g. To how many significant figures is the mass of the solid known?