

Chemistry 105, Chapter 1 Exercises

Classifying Matter

- Classify each pure substance represented below by a capital letter as an element or a compound. Indicate when such a classification cannot be made.
 - Substance A is composed of heteroatomic molecules.
 - Substance E is changed into substances G and J when it is heated.
 - Two substances when mixed combine to form only substance L.
 - An element and a compound when mixed form substances M and Q.
 - Substance X is not changed by heating.
- Classify each of the following as element, compound, homogeneous mixture, or heterogeneous mixture. Only one answer applies to each.

a. silver	e. platinum	i. seawater
b. ethyl alcohol C_2H_5OH	f. table salt $NaCl$	j. wine
c. milk	g. sugar	k. chocolate chip cookies
d. aluminum	h. maple syrup	l. vanilla ice cream
- Classify each of the following as homogeneous matter or heterogeneous matter. Only one answer applies to each.

a. silver	e. platinum	i. seawater
b. ethyl alcohol C_2H_5OH	f. table salt $NaCl$	j. wine
c. milk	g. sugar	k. chocolate chip cookies
d. aluminum	h. maple syrup	l. vanilla ice cream
- Classify the following as polyatomic molecule, diatomic molecule, homoatomic molecule, heteroatomic molecule, element, and compound. More than one answer will apply to each.

a. S_8	d. Br_2	g. $AlCl_3$
b. $CaCO_3$	e. KI	
c. H_2O_2	f. Fe	

Classifying Properties and Changes

- The following data refer to the compound water. Classify each as a chemical or physical property.
 - It is a colorless liquid at $25^\circ C$ and 1 atm.
 - It reacts with sodium to form hydrogen gas as one of the products.
 - It melts at $0^\circ C$.
 - It does not dissolve in hexane.
- The following refer to the element phosphorous. Classify each as a chemical or physical property.
 - It exists in several forms, for example, white, black, and red phosphorous.
 - It is a solid at $25^\circ C$ and 1 atm.
 - It burns in chlorine to form phosphorous trichloride.
 - The density of black phosphorous is 2.7 g/mL .
 - It is a poor conductor of electricity.
- Classify the following changes as chemical or physical.

a. Aluminum metal corrodes.	e. Nitroglycerin explodes.
b. Aluminum melts.	f. A match burns.
c. Aspirin is pulverized.	g. A piece of metal gets warmer.
d. A candy bar is digested.	h. Soot (carbon) is deposited on metal.

- i. Water condenses on metal.
- j. Sodium chloride boils.

k. A hot piece of iron glows red.

Significant Figures

8. How many significant figures are there in each of the following?

- a. 0.136 m
- b. 0.0001050 g
- c. 2.700×10^3 nm
- d. $6. \times 10^{-4}$ L
- e. 5600.3 cm³

9. How many significant figures are there in the values of x obtained from:

- a. $x = 34.0300\text{g}/12.09\text{cm}^3$
- b. $x = (0.00630\text{cm})(2.003\text{cm})(200.0\text{cm})$
- c. $x = 32.647\text{in} - 32.327\text{in}$
- d. $x = (236.45\text{g} - 1.3\text{g})/[(3.4561\text{cm})(32.567\text{cm}^2)]$
- e. $x = 13.2\text{g} + 1468.\text{g} + 0.04\text{g}$
- f. $x = (2.\text{g} + 0.127\text{g} + 459.\text{g})/(6.2\text{cm}^3 - 0.567\text{cm}^3)$

10. Round the following to the indicated number of significant figures.

- a. 132.505 (4 sig figs)
- b. 298.693 (5 sig figs)
- c. 13.452 (2 sig figs)
- d. 345. (2 sig figs)
- e. 7.4855 (3 sig figs)
- f. 8.348 (2 sig figs)

11. How precisely are the following numbers known?

- a. 5.5×10^6
- b. 5.500×10^6
- c. 6.23×10^{-5}

Conversions

12. Make the following conversions.

- a. 69.0in to cm
- b. 170. pounds to Kg
- c. .000006 nm to m
- d. 576.0 g to Mg
- e. 35,000. ft to miles
- f. 6.0 miles to inches
- g. 28. Kg to oz
- h. 500. nm to Km
- i. 5.0 L to gal
- j. 0.006876 mg to Kg

13. Convert 30.5 miles/gal to km/L

14. Convert 50. knots to miles per hour. 1 knot = 1 nautical mi/hr (exactly). 1 nautical mile = 6076.12 ft

15. The speed of light is 3.0×10^{10} cm/s. Convert this to miles per hour. The moon is approximately 250,000 miles away from earth. Traveling at the speed of light how long would it take to get to the moon?

16. The solubility of ammonium bromide in water at 20°C is 75.5g/100g water.

- a. Calculate the mass of ammonium bromide that dissolves in 62.0 g of water at 20°C.
- b. Calculate the mass of water needed to dissolve 40.0 grams of ammonium bromide.

17. Cholesterol in blood is measured in mg of cholesterol/dL of blood. Convert 185. mg/dL to g/mL.

18. A cup of brewed coffee is made with about 9.0 g of ground coffee beans. If a student brews three cups of gourmet coffee a day, how much does the student spend on a year's supply of gourmet coffee that sells at \$8.99/pound? 1 pound = 453.6 g

19. Convert 5.0 cm^3 to in^3 .

