

**Chapter 1:** pg. 32 # 11, 12, 15, 16, 18, 21, 22, 33, 35, 36, 37, 39, 41, 49, 54, 79, 81, 83, 85 and 3 others

**1.11 Do the following statements describe chemical, physical or nuclear properties?**

- (a) Oxygen gas supports combustion. \_\_\_\_\_
- (b) Fertilizers help to increase agricultural production. \_\_\_\_\_
- (c) Water boils below 100°C on top of a mountain. \_\_\_\_\_
- (d) Lead is denser than aluminum. \_\_\_\_\_.
- (e) Uranium is a radioactive element. \_\_\_\_\_

**1.12 Does each of the following describe a physical change or a chemical change?**

- (a) The helium gas inside a balloon tends to leak out after a few hours \_\_\_\_\_
- (b) A flashlight beam slowly gets dimmer and finally goes out. \_\_\_\_\_.
- (c) Frozen orange juice is reconstituted by adding water to it. \_\_\_\_\_
- (d) The growth of plants depends on the sun's energy in a process called photosynthesis.  
\_\_\_\_\_
- (e) A spoonful of table salt dissolves in a bowl of soup. \_\_\_\_\_

**1.15 Classify each of the following substances as an element or a compound:**

- (a) hydrogen: \_\_\_\_\_ (b) water: \_\_\_\_\_ (c) gold: \_\_\_\_\_ (d) sugar: \_\_\_\_\_

**1.16 Classify each of the following as an element, a compound, or mixture:**

- (a) seawater: \_\_\_\_\_ (b) helium gas: \_\_\_\_\_
- (c) sodium chloride: \_\_\_\_\_ (d) soft drink: \_\_\_\_\_
- (e) milkshake: \_\_\_\_\_ (f) air: \_\_\_\_\_
- (g) concrete: \_\_\_\_\_

**1.18 Determine the following equivalences for each of the prefixes given: See text--Table 1.3 (p17)**

(a) mega: 1 Mm = m	(e) milli: 1 mL = L (or 1 L = mL)
(b) kilo: 1kJ = kJ	(f) micro( $\mu$ ): 1 $\mu$ g = g (or 1 g = $\mu$ g)
(c) deci: 1dm = m (or 1m = dm)	(g) nano: 1nm = m (or 1m = nm)
(d) centi: 1 cL= L (or 1L = cL )	(h) pico: 1 ps = s (or 1s = ps)

- 1.21 Bromine is a reddish-brown liquid. Calculate its density (in g/mL) if 586 g of the substance occupies 188 mL.
- 1.22 The density of ethanol, a colorless liquid that is commonly known as grain alcohol, is 0.798 g/mL. Calculate the mass of 17.4 mL of the liquid.

- 1.33 What is the number of significant figures in each of the following measurements? If the number of significant figures is ambiguous, write all possibilities.

(a) 4867 mi:	(e) 40.020 g/cm <sup>3</sup> :
(b) 56.0 mL:	(f) 0.0000003 cm:
(c) 60,104 ton:	(g) 0.030540 min:
(d) 2900 g:	(h) 4.60×10 <sup>19</sup> atoms:

- 1.35 Carry out the following operations and express each answer with the correct units and with the correct number of digits. (Remember: Keep the least number of decimal places for addition and subtraction and keep the least number of significant figures for multiplication and division.)

- (a)  $5.6792 \text{ m} + 0.6 \text{ m} + 4.33 \text{ m} =$  \_\_\_\_\_
- (b)  $3.70 \text{ g} - 2.9133 \text{ g} =$  \_\_\_\_\_
- (c)  $(4.51 \text{ cm})(3.6666 \text{ cm}) =$  \_\_\_\_\_
- (d)  $(0.00005 \text{ cm})(538 \text{ cm}^2) =$  \_\_\_\_\_

- 1.36 Carry out the following operations and express each answer with the correct units and with the correct number of digits. (Again-- Keep the least number of decimal places for addition and subtraction and keep the least number of significant figures for multiplication and division. Also, if a number has an ambiguous number of sig figs, assume the least number of sig figs possible.)

- (a)  $\frac{7.310 \text{ km}}{5.70 \text{ km}} =$
- (b)  $0.00326 \text{ mg} - 0.0000788 \text{ mg} =$
- (c)  $(0.402 \times 10^7 \text{ dm}) + (7.74 \times 10^7 \text{ dm}) =$
- (d)  $(220 \text{ cm})(34.0 \text{ cm})(0.0456 \text{ cm}) =$
- (e)  $\frac{(3.54 \text{ m} - 0.14 \text{ m})}{28.2 \text{ s}} =$

**1.37 Carry out the following conversions:** *Show work using factor label method (dimensional analysis).*

(a)  $22.6 \text{ m} = ? \text{ dm}$

(b)  $25.4 \text{ mg} = ? \text{ kg}$

(c)  $556 \text{ mL} = ? \text{ L}$

(d)  $10.6 \text{ kg/m}^3 = ? \text{ g/cm}^3$

**1.39 The average speed of helium at 25°C is 1255 m/s. Convert this speed to miles per hour.**

*Helpful info: 1 mile = 1609 m*

**1.41 How many minutes does it take for light to travel from the sun to the Earth?**

*Helpful info: The distance from the sun to Earth is 93 million miles(  $93 \times 10^6 \text{ mi}$ ).*

*The speed of light =  $3.00 \times 10^8 \text{ m/s}$ ; 1 mile = 1609 m*

**1.49 Aluminum is a lightweight metal (density =  $2.70 \text{ g/cm}^3$ ) used in aircraft construction, high-voltage transmission lines, beverage cans and foils. What is its density in  $\text{kg/m}^3$ ?**

**1.54 In determining the density of a rectangular metal bar, a student made the following measurements: length = 8.53 cm; width = 2.4 cm; height = 1.0 cm; mass = 52.7064 g. Calculate the density of the metal to the correct number of significant figures.**

**1.79 Chalcopyrite, the principal ore of copper (Cu), contains 34.63 percent Cu by mass. How many grams of Cu can be obtained from  $5.11 \times 10^3 \text{ kg}$  of the ore?**

*Hint: "34.63 percent Cu by mass" means that there are 34.63 kg of Cu in 100 kg of ore.*

- 1.81** A 1.0 mL volume of seawater contains about  $4.0 \times 10^{-12}$  g of gold. The total volume of ocean water is  $1.5 \times 10^{21}$  L. Calculate the total amount of gold (in grams) that is present in seawater, and the worth of the gold in dollars.

*Assume gold costs \$1300 per ounce (This was the price of gold in June 2019).*

*1 lb = 453.6 g; 1 lb = 16 oz*

With so much gold in the ocean, why hasn't someone become rich by mining gold from the ocean?

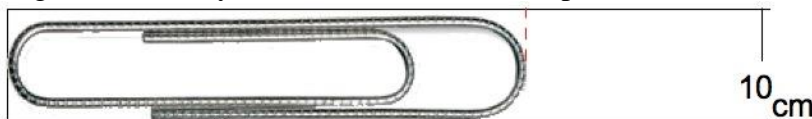
- 1.83** The thin outer layer of Earth, called the crust, contains only 0.50 % of Earth's total mass and yet it is the source of almost all of the elements found on Earth. Silicon (Si) is the second most abundant element in Earth's crust (27.2 % by mass). Calculate the mass of silicon (in kg) in Earth's crust.

*The mass of Earth is  $5.9 \times 10^{21}$  tons. 1 ton = 2000 lbs; 1 kg = 2.205 lbs*

- 1.85** One gallon of gasoline in an automobile's engine produces on the average 9.5 kg of CO<sub>2</sub>, which is a greenhouse gas. (It promotes the warming of Earth's atmosphere) Calculate the annual production of CO<sub>2</sub> (in kg) if there are 40 million cars in the United States and each car covers a distance of 5000 miles at a consumption rate of 20 miles per gallon.

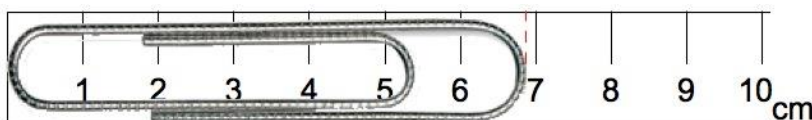
- A.** Measure the length of the paper clip, in cm, using the three differently calibrated rulers below.

The measurements will NOT be identical. You must read to the calibration markings and then estimate the next decimal place as the final digit. Cover up the ruler(s) below the one you are using to prevent being influenced by them. Also, indicate the precision as  $\pm 1$  in the estimated digit. (Ex:  $4.5 \pm 0.1$  cm)



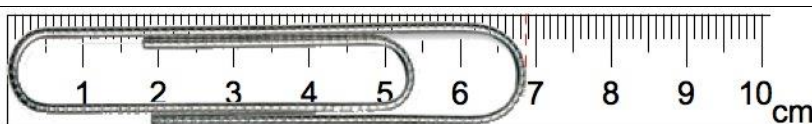
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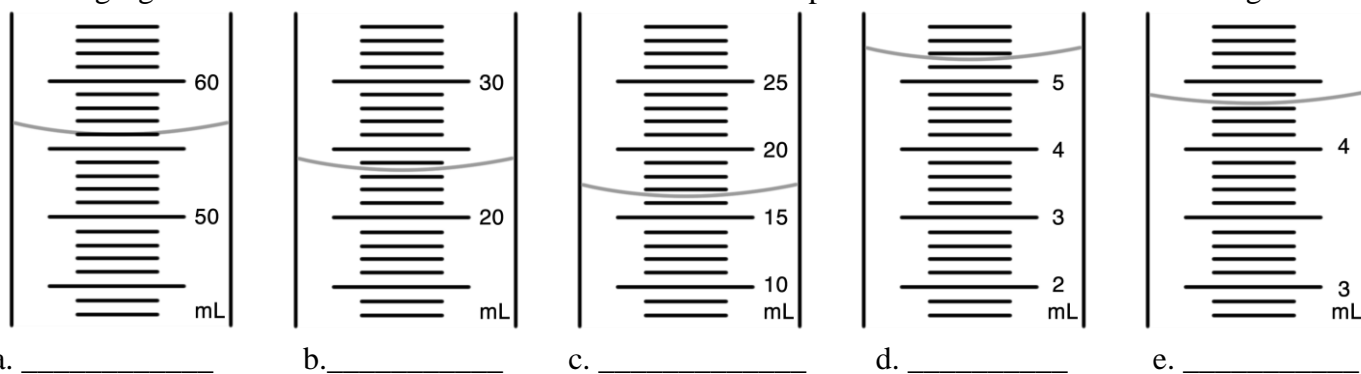
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**B. Measuring Volume:** Determine the volume of H<sub>2</sub>O in the following graduated cylinders, using the correct sig figs. Read at the bottom of the meniscus. Indicate the precision as  $\pm 1$  in the estimated digit.



**C.** Two students measured the densities of 3 separate samples of sucrose (accepted density =  $1.59 \text{ g/cm}^3$ ) and obtained the following results. Into the table, fill in the average density for each student. Then, use that average density to determine each student's % error.

%Error (B) =

%Error (C) =

Which student was the most accurate? \_\_\_\_ Explain why.

Density Data of Sucrose		
	Student B	Student C
Trial	Density ( $\text{g/cm}^3$ )	Density ( $\text{g/cm}^3$ )
1	1.40	1.70
2	1.68	1.69
3	1.45	1.71
Avg		
% error		

Which student was the most precise? \_\_\_\_ Explain why.

**Chapter 2:** pg. 69 #11, 13, 17, 20, 27, 28, 41, 43, 47, 64, 69, 87

2.11 What do we call atoms of the same elements with different mass numbers? \_\_\_\_\_

2.13 What is the mass number of an iron atom that has 28 neutrons? \_\_\_\_\_

2.17 Give the symbol for the following isotopes: (Show both the atomic # and mass # in symbol.)

(a) atomic number = 11 mass # = 23

(b) atomic number = 28 mass # = 64

2.20 State two differences between a metal and a nonmetal.

2.27 What is the difference between an atom and a molecule?

