

## TUTORIAL 1

Name:

Instructor:

1. Write the numbers presented by the following prefixes:

mega-	kilo-	micro-	nano-	pico-	deci-	centi-	milli-

2. What is the number of significant figures in each of the following measurements?

Measurements	No. of significant figures
5075710.019 s	
2200 g	
4.020 km	
0.0000003 kg	
$2.00 \times 10^{19}$ atoms	

3. Carry out the following conversions using Factor Label Method.

482.2 in <sup>3</sup> to cubic centimeter	476 cm <sup>2</sup> to square inches

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4. To determine the density of ethyl alcohol, a student pipet 5.00 mL sample into an empty flask weight 15.246 g, he finds that the mass of the flask + ethyl alcohol = 19.171 g. Calculate the density of ethyl alcohol.
  
  
  
  
  
  
  
  
  
  
5. The density of ethanol, a colorless liquid is 0.798 g/mL. Calculate the mass of 17.4 mL of the liquid?
  
  
  
  
  
  
  
  
  
  
6. The commonly accepted measurement now used by dietary specialist in assessing whether a person is overweight is the body mass index (BMI). BMI is based on a person's weight and height. It is the mass, in kilograms, divided by the square of the height in meters, which is, expressed in  $\text{kg/m}^2$ . Generally speaking, if the BMI exceeds 25, a person considered overweight. What is the BMI of a person being 69.0 inches tall and weight 158.0 lb.?

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7. Give the number of protons, neutrons and electrons in each of the following species

Species	$^{17}_8\text{O}$	$^{199}_{80}\text{Hg}$	$^{200}_{80}\text{Hg}$	$^{14}_7\text{N}^{3-}$	$^{54}_{26}\text{Fe}^{2+}$	$^{31}_{15}\text{P}^{3-}$	$^{107}_{47}\text{Ag}^{+}$
Proton							
Neutron							
Electron							

8. Europium has two naturally occurring isotopes which are Eu-151 and Eu-153. Eu-151 has a mass of 150.9198 amu and a natural abundance of 47.8%. Using the atomic mass of europium, find the mass of Eu-153.

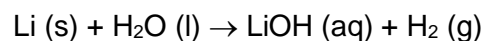
9. Calculate

a) The mass in gram, of 0.155 mol  $\text{C}_3\text{H}_8$

b) The number of moles of  $\text{C}_4\text{H}_{10}$  in a 165 kg sample

10. Melamine, which is used to make plastic items such as dishes and toys, contains 28.57% carbon, 4.80% hydrogen and 66.64% nitrogen. If the molar mass is 126 g/mol, what is the molecular formula of melamine?

11. All alkali metals react with water to produce hydrogen gas and the corresponding alkali metal hydroxide. A typical reaction is that between lithium and water.



- a) Balance the equation.
- b) How many moles of  $\text{H}_2$  will be formed by the complete reaction of 6.23 moles of Li with water?
- c) How many grams of  $\text{H}_2$  will be formed by the complete reaction of 80.57 g of Li with water?

12. Urea,  $(\text{NH}_2)_2\text{CO}$  is prepared by reacting ammonia with carbon dioxide:



In one process 637.2 g of  $\text{NH}_3$  are allowed to react with 1142 g of  $\text{CO}_2$ .

a) Which of the reactants is limiting reagent?

b) Calculate, the mass of  $(\text{NH}_2)_2\text{CO}$  formed?

13. Describe how you would prepare  $5.00 \times 10^2$  mL of 1.75 M  $\text{H}_2\text{SO}_4$  solution starting with an 8.61 M stock solution of  $\text{H}_2\text{SO}_4$

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14. How many milliliter of a 0.610 M NaOH solution are needed to neutralize 20.0 mL of a 1.75 M H<sub>2</sub>SO<sub>4</sub> solution?

