

- 1a. Convert 2.5mol of lithium atoms into the number of individual atoms.
- 1b. Convert  $3.76 \times 10^{22}$  sulfur atoms into mol of sulfur atoms.
- 2a. Calculate or find the molar mass of the element potassium
- 2b. Calculate or find the molar mass of the element oxygen
- 2c. Calculate the molar mass of potassium acetate.
3. Given the reaction:  $4\text{Na(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{Na}_2\text{O(s)}$
- a. How many moles of oxygen react with 1.0 mole of sodium?
- b. How many moles of sodium react with 1 mole of oxygen?
- c. How many atoms of sodium react with 2 molecules of oxygen
- d. How many moles of sodium must react to form 2.25moles of  $\text{Na}_2\text{O}$ ?
- e. How many grams of  $\text{Na}_2\text{O}$  can form from 3.0g of Na?
- f. How many grams of oxygen react with 3.0g of Na?
4. Given the reaction:  $6\text{K(s)} + \text{N}_2\text{(g)} \rightarrow 2\text{K}_3\text{N(s)}$
- a. How many moles of potassium react with 1.3 moles of nitrogen?
- b. How many moles of potassium nitride form from 3.4moles of potassium?
- c. How many moles of nitrogen does it take to form 1.6mol of potassium nitride?
- d. How many grams of nitrogen react with 5.0g of potassium?
- e. How many grams of potassium nitride form from 5.0g of potassium?
- f. How many grams of nitrogen are needed to form 6.0g of potassium nitride?
- 5a. Heptane should dissolve in which of the following: water, methanol, acetone, toluene
- 5b. Acetic acid should dissolve in which of the following: hexane, formic acid, heptane, chloroform

5c. Miscible liquids do which of the following: dissolve in each other, don't dissolve in each other, lubricate well, are difficult to mix.

5d. Sucrose would be expected to dissolve in which one: water or chloroform

5e. Naphthalene ( $C_{10}H_8$ ) would be expected to dissolve in which one: methanol or toluene

5f. Sodium chloride would be expected to dissolve in which of the following: water or hexane

6a. Calculate the mass percent of potassium chloride for 5.3g of potassium chloride dissolved in 63.5g of water.

6b. For a solution that is 4.5% sodium iodide by mass, how many grams of solution provide 0.17g of sodium iodide?

6c. A mass of 37g of a 8.1% lithium bromide solution contains what mass of lithium bromide?

7a. Calculate the molarity of 7.16g of sodium chloride when water is used to make 350mL of solution.

7b. To make a 4.0M solution of calcium nitrate using 6.4g of calcium nitrate, what should be the volume of the solution in mL?

7c. A volume of 48.5mL of 6.5M HCl contains how many moles of HCl?

8a. How many milliliters of 6.0M  $HNO_3$  are needed to prepare 300.mL of a 0.50M solution?

8b. A volume of 92mL of 7.2M HBr is what concentration when diluted to 1.5L?

8c. A volume of 68mL of 7.8M HF produces how many milliliters of a 0.5M solution?

9. Given this reaction:  $CO_2(g) + H_2(g) \rightarrow CH_4(g) + H_2O(l)$

a. Provide the oxidation numbers of C and O in  $CO_2$ .

b. Provide the oxidation number of H in  $H_2$ .

c. Provide the oxidation numbers of C and H in  $CH_4$ .

d. Provide the oxidation numbers of H and O in  $H_2O$ .

e. Which substance is oxidized?

f. Which substance is reduced?

g. Which substance is the oxidizing agent?

h. Which substance is the reducing agent?

- 10a. What are the oxidation numbers of N and F in  $\text{NF}_4^-$ ?  
10b. What are the oxidation numbers of S and O in  $\text{SO}_3^{2-}$ ?  
10c. What is the oxidation number of Mg?  
10d. What is the expected oxidation number of Mg in compounds?  
10e. What is the oxidation number of S?  
10f. What is the expected oxidation number of S in compounds?  
10g. What are the oxidation numbers of C, H and O in  $\text{C}_2\text{H}_2\text{O}_2$ ?

11. Given this reaction:  $4\text{Al}(\text{s}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{Al}_2\text{O}_3(\text{s})$

- a. Provide the oxidation number of Al(s).  
b. Provide the oxidation number of O in  $\text{O}_2$ .  
c. Provide the oxidation numbers of Al and O in  $\text{Al}_2\text{O}_3$ .  
d. Which substance is oxidized?  
e. Which substance is reduced?  
f. Which substance is the oxidizing agent?  
g. Which substance is the reducing agent?

See class notes for answers to these questions

- 12a. Name the three types of natural radiation  
12b. What shielding is required to protect from the three types of natural radiation?  
12c. How does radiation harm living organisms?  
12d. Which types of radiation can be deflected by an electric field?  
12e. Which radiation has the highest energy?  
12f. What is the charge on the type of natural radiation with the lowest penetrating power?

13a. Given 120mg initially of radioactive strontium-90, what mass remains after 4 half lives?

13b. If the half life is 7 days, how many days must pass for 4 half lives?

13c. Given 120.mg initially of radioactive strontium-90, what mass remains after 42 days if the half life is 7 days?

14a. Be able to classify molecules using these terms: hydrocarbon, hydrocarbon derivative, saturated hydrocarbon, unsaturated hydrocarbon, aromatic hydrocarbon.

14b. Be able to go between any of the following for organic compounds: name of compound, class/family name, functional group, general formula.

14c. Classify  $\text{CH}_4$  using the above terms.

14d. Classify  $\text{CH}_3\text{Cl}$  using the above terms.

14e. Classify acetone using the above terms.

15a. Be able to provide definitions of and classify biological compounds as carbohydrates, lipids, nucleic acids, or proteins.

15b. Be able to provide the names, composition, examples, and structures of carbohydrates, lipids, nucleic acids, and proteins.

15c. Classify glucose using the above terms.

15d. Provide/describe the composition of proteins.

16) What is the molar mass of  $\text{CO}_2$

17) How many moles is 17.0g of chlorine gas

18) What is the mass of 1 mol of sodium atoms

19) What is the molar mass of aluminum chloride

20) Given the balanced reaction:  $2\text{C}_2\text{H}_6(\text{g}) + 7\text{O}_2(\text{g}) \rightarrow 4\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{g})$ , how many moles of  $\text{CO}_2$  can be formed from 10.0 moles of  $\text{O}_2$ ?

21) Given the balanced reaction:  $2\text{C}_2\text{H}_6(\text{g}) + 7\text{O}_2(\text{g}) \rightarrow 4\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{g})$ , how many grams of  $\text{H}_2\text{O}$  can be formed from 10.0g of  $\text{C}_2\text{H}_6$ ?