HOMEWORK

It is all about the learning Unit 5 HW

Name:		**Period**:	1/3 5/7 6/8 10/12	**Due**:	/ / **17**

Unit 5:	**Stoichiometry**

Standards Assessed	*Pre-Rating*
5.a I can balance chemical reactions and explain them conceptually using the concept of conservation of mass.	
5.b I can relate reactants to products using a chemical reaction and can convert from molecules A to molecules B or moles A to moles B.	
5.c I can define a mole and Avogadro's number and can use it to convert from molecules to moles.	
5.d I can calculate the number of grams in one mole of any compound based on the formula.	
5.e I can convert from grams A to grams B, or any other two step conversion in a reaction.	

Homework Instructions

Annotate the problems, just like you would during an exam. Keep up with the homework each night, and ask questions during class or office hours on homework problems. You should also be reviewing vocabulary and your notes each night. **Remember, homework must be fully completed in order for an exam to go in the gradebook.**

Question 5.1) Convert the following numbers to scientific notation.	Standard	0.c

Response:

a) 4,300,000,000
b) 0.00074
c) 5,840
d) 72
e) 7020

Grading notes:

Question 5.2) Convert the following numbers into standard form.	Standard	0.c

Response:

a) 8.54×10^{5}
b) 2.101×10^{-8}
c) 3.051×10^{7}
d) 5.94×10^{-3}
e) 8.27×10^{-9}
f) 3.86×10^{2}

Grading notes:

Question 5.3) Compute the following problems. Keep your answers in scientific notation.	Standard	0.c
Response: a) $(1.0 \times 10^{23})(2.0 \times 10^{4}) =$ b) $(2.5 \times 10^{2})(5 \times 10^{2}) =$ c) $(1.0 \times 10^{5})(5.0 \times 10^{5}) =$ d) $(2.0 \times 10^{5})(6.0 \times 10^{5}) =$ e) $(5.0 \times 10^{5}) / (1.0 \times 10^{3}) =$ f) $(4.0 \times 10^{8}) / (2.0 \times 10^{3}) =$ g) $(6.0 \times 10^{5}) / (3.0 \times 10^{1}) =$ h) $(8.0 \times 10^{28}) / (2.0 \times 10^{5}) =$		
Grading notes:		

Question 5.4) If 3 woodchucks can chuck 11 pieces of wood, how many woodchucks would it take to chuck 121 pieces of wood? **Circle your conversion factor.**	Standard	0.c
Response:		
Grading notes:		

Question 5.5) Ms. Chen has 13 books per shelf. If there are 3 bookshelves that each have 5 shelves, how many books does Ms. Chen have? **Circle your conversion factor(s)**	Standard	0.c
Response:		
Grading notes:		

Question 5.6) How many atoms of hydrogen are in 13 molecules of ammonia (NH_3)?	Standard	5.a
Response:		
Grading notes:		

Question 5.7) If there are 72 atoms of oxygen in a sample of glucose ($C_6H_{12}O_6$), how many molecules of glucose are there?	Standard	5.a
Response:		
Grading notes:		

Question 5.8) Write sentences describing the following reactions:	Standard	5.a
Response: a) $2NH_3(g) \rightarrow 3H_2(g) + N_2(g)$ b) $2Na(s) + O_2(g) \rightarrow 2NaO(s)$		
Grading notes:		

Question 5.9) What happens to the amount of each compound in the reaction below as the reaction proceeds? $2NH_3(g) \rightarrow 3H_2(g) + N_2(g)$	Standard	5.a
Response:		
Grading notes:		

Use the scenario below to answer questions 5.10-5.13

Vinegar and baking soda react to produce bubbles that people will often use to making volcano models. Two vinegar molecules ($C_2H_4O_2$) react with one unit of baking soda ($CaCO_3$) to form one water molecule, one carbon dioxide molecule, and one unit of aqueous calcium acetate. This is an example of a neutralization reaction. For these problems, letôs assume that 32 molecules of vinegar react fully with excess baking soda.

Question 5.10) Write the neutralization reaction described above.	Standard	5.a
Response: _____(l) + ____CO_3(s) → ____(l) + _____(g) + $Ca(C_2H_3O_2)_2$(___)		
Grading notes:		

Question 5.11) How many atoms of hydrogen are contained in the vinegar ($C_2H_4O_2$) before the reaction occurs?	Standard	5.a
Response:		
Grading notes:		

Question 5.12) How many atoms of hydrogen are contained in the 16 units of calcium acetate that are produced?	Standard	5.a
Response:		
Grading notes:		

Question 5.13) Why are there less hydrogen atoms in the calcium acetate than in the vinegar? Where did the other hydrogen atoms go?	Standard	5.a
Response:		
Grading notes:		

Question 5.14) Balance the following equations.	Standard	5.a
Response: ____ P_4 + ____ O_2 → ____ P_2O_3 ____ CF_4 + ____ Br_2 → ____ CBr_4 + ____ F_2 ____ N_2 + ____ H_2 → ____ NH_3 ____ NaF + ____ Br_2 → ____ NaBr + ____ F_2		
Grading notes:		

Question 5.15) When balancing chemical reactions, the subscripts can never be changed for a certain chemical. However, the coefficients can change. Explain.	Standard	5.a
Response:		
Grading notes:		

Question 5.16) Balance the equations below.	Standard	5.a
Response: ____ $AlBr_3$ + ____ K_2SO_4 → ____ KBr + ____ $Al_2(SO_4)_3$ ____ NH_3 + ____ H_2SO_4 → ____ $(NH_4)_2SO_4$		
Grading notes:		

Use the scenario below to answer questions 5.17-5.20

Alberto isolates an unknown hydrocarbon. He knows that the compound contains only hydrogen and carbon (H and C), but he doesnôt know much else. In order to determine the amount of carbon and hydrogen, he burns a sample of the compound. For every molecule of the unknown hydrocarbon burnt, 6 molecules of carbon dioxide (CO_2) and 3 molecules of water (H_2O) are produced. He knows that all of the carbon atoms from the hydrocarbon end up in the carbon dioxide and that all of the hydrogen atoms from the hydrocarbon end up in the water.

Question 5.17) How many atoms of C are in the unknown molecule?	Standard	5.a
Response:		
Grading notes:		

Question 5.18) How many atoms of H are in the unknown molecule?	Standard	5.a
Response:		
Grading notes:		

Question 5.19) What is the formula for the unknown molecule?	Standard	5.a
Response:		
Grading notes:		

Question 5.20) Write and balance the chemical equation for the combustion of the unknown compound.	Standard	5.a
Response:		
Grading notes:		

Question 5.21) The oxidation of aluminum is shown below. Balance the equation and perform the conversions requested.	Standard	5.a, 5.b

Response:

$$\_\_\_Al(s) + \_\_\_O_2(g) \rightarrow \_\_\_Al_2O_3(s)$$

a) How many units of Al_2O_3 would form if there were only 6 molecules of oxygen, and the aluminum reacted fully?

b) If 6 molecules of oxygen react, how many atoms of aluminum are required to react fully?

Grading notes:

Question 5.22) The reaction of vandium (V) oxide and calcium sulfide is shown below. Balance the equation and perform the conversions requested.	Standard	5.a, 5.b

Response:

$$\_\_\_V_2O_5 + \_\_\_CaS \rightarrow \_\_\_CaO + \_\_\_V_2S_5$$

a) How many units of vanadium (V) sulfide will be produced if 15 units of calcium sulfide react?

b) If 15 units of calcium sulfide react, how many units of vanadium (V) oxide are needed?

Grading notes:

Use the scenario below to answer questions 5.23-5.26

The rusting of iron is a very problematic issue for anyone who has an older car or tool made of iron. The iron reacts with oxygen in the air to create iron (III) oxide, which is brittle and quickly breaks down under any sort of stress. A certain tool contains 3.0×10^{24} atoms of iron. The tool is sealed in a flask with 1.0×10^{22} molecules of oxygen. The tool will crumble into dust if 10% of the iron in the tool turns into rust (iron (III) oxide).

Question 5.23) Balance the equation for forming rust.	Standard	5.a
Response:		
Grading notes:		

Question 5.24) How many atoms of iron need to react in order for the tool to break?	Standard	0.c
Response:		
Grading notes:		

Question 5.25) How many molecules of oxygen need to react in order for the tool to break?	Standard	5.b
Response:		
Grading notes:		

Question 5.26) Will the tool break? Explain.	Standard	5.b
Response:		
Grading notes:		

Question 5.27) What is the mole and how was it defined?	Standard	5.c
Response:		
Grading notes:		

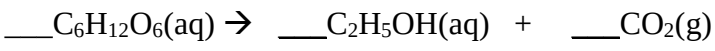
Question 5.28) Convert each number from moles to particles	Standard	5.c
Response: a) How many atoms are in 4.0 moles of helium? b) How many molecules are in 0.5 moles of oxygen gas?		
Grading notes:		

Question 5.29) Convert each number from particles to moles.	Standard	5.c
Response: a) How many moles are in 2.4×10^{26} atoms of nitrogen? b) How many moles are in 3.01×10^{23} molecules?		
Grading notes:		

Question 5.30) There are three boxes. One has two moles of dollar bills. The other has 1 twenty dollar bill. The third has 1.2×10^{23} dollar bills. Which has the most money? Justify your answer with a complete sentence.	Standard	5.c
Response:		
Grading notes:		

Use the scenario below to answer questions 5.31-5.34

A common production of alcohol is in the fermentation of glucose ($C_6H_{12}O_6$) which produces ethyl alcohol (C_2H_5OH) and carbon dioxide. This process is accomplished through the use of yeast, and can be used to produce alcoholic beverages such as wine and beer. The carbon dioxide is what gives the carbonation in beer. Home brewers have to be careful that they donât add so much sugar (glucose) that so much carbon dioxide is released and the keg explodes. In a certain brewing run, 1.5×10^{23} molecules of ethyl alcohol are produced. If the keg is designed to withstand the pressure caused by anything less than 2 moles of carbon dioxide.

Question 5.31) Balance the equation for the fermentation of glucose.	Standard	5.a
Response: 		
Grading notes:		

Question 5.32) If 1.5×10^{23} molecules of ethyl alcohol are produced, how many moles of ethyl alcohol is that?	Standard	5.c
Response:		
Grading notes:		

Question 5.33) How many molecules of carbon dioxide are produced along with the ethyl alcohol?	Standard	5.b, 5.c
Response:		
Grading notes:		

Question 5.34) Will the keg explode? Justify your answer.	Standard	5.b, 5.c
Response:		
Grading notes:		

Question 5.35) Balance the reaction below and describe it in words by filling in the sentence frame.	Standard	5.a

Response:

___$PbCl_4(s)$ → ___$Cl_2(g)$ + ___$Pb(s)$

_____ unit(s) of solid Lead (IV) Chloride decomposes to form _____

_____.

Grading notes:

Question 5.36) Consider the synthesis of laughing gas (N_2O). How many molecules of oxygen gas, O_2, would it take to produce 5 moles of laughing gas, N_2O? _____ $N_2(g)$ + _____$O_2(g)$ → _____ $N_2O(g)$	Standard	5.a, 5.b, 5.c

Response:

Grading notes:

Question 5.37) How many moles of oxygen are needed to fully react with 16 moles of hydrogen according the reaction below? $2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$	Standard	5.b

Response:

Grading notes:

Question 5.38) Which has the most atoms: 1 mole of solid magnesium, 1 mole of gaseous neon, or 1 mole of liquid mercury? Explain.	Standard	5.c

Response:

Grading notes:

Use the scenario below to answer questions 5.39-5.42

Nearly all of the chemical energy that we use is derived from photosynthesis in plants by one way or the other. Plants that we eat or use for clothing rely on photosynthesis directly to live. If plants didnôt live, then animals would not have anything to eat and would die off. Even the crude oil that we refine to make gasoline for our cars comes from dead plants that have decayed underground for a very long time. A certain plant is enclosed in a gar with 6 moles of carbon dioxide and 3 moles of water. The plant is given enough light to fuel the photosynthesis reaction.

Question 5.39) Balance the photosynthesis reaction below.	Standard	5.a
Response: ____$CO_2(g)$ + ____$H_2O(l)$ → _____$C_6H_{12}O_6(s)$ + ____$O_2(g)$		
Grading notes:		

Question 5.40) How many moles of glucose ($C_6H_{12}O_6$) can be produced from the 6 moles of carbon dioxide?	Standard	5.b
Response:		
Grading notes:		

Question 5.41) How many moles of glucose can be produced from the 3 moles of water?	Standard	5.b
Response:		
Grading notes:		

Question 5.42) Based on your answers from questions 3.40 and 3.41, how many moles of glucose do you think will actually be produced?	Standard	5.b
Response:		
Grading notes:		

Question 5.43) Calculate the molar masses for each compound below.	Standard	5.d

Response:

a) H_2O

b) Br_2

c) NaOH

d) $Mg(OH)_2$

e) $(NH_4)_2O$

f) $C_8H_{10}N_4O_2$ (Caffeine)

Grading notes:

Question 5.44) The gram formula mass of sodium chloride is 58.0 grams per mole. How many units of sodium chloride does this mass represent? Explain.	Standard	5.d

Response:

Grading notes:

Question 5.45) Consider this balanced double replacement reaction: $2\ AgNO_3(aq) + CaI_2(aq) \rightarrow Ca(NO_3)_2(aq) + 2AgI(s)$ If I use 17.0 grams of silver nitrate, $AgNO_3$, how many moles of calcium nitrate, $Ca(NO_3)_2$, can be produced?	Standard	5.d, 5.e

Response:

Grading notes:

Use the scenario below to answer questions 5.46-5.48 (You may use a calculator for this one)

Aluminum chips are sometimes added to sodium hydroxide based drain cleaners because they react to generate hydrogen gas, which bubbles and helps loosen material in the drain. In one instance, 20g of aluminum and 20g of sodium hydroxide (NaOH) are used. The equation is:

$$2Al(s) + 2NaOH(aq) + 6H_2O(l) \rightarrow 2Na[Al(OH)_4](aq) + 3H_2(g)$$

Question 5.46) How many grams of hydrogen will be produced if all of the aluminum reacts?	Standard	5.b, 5.d, 5.e
Response:		
Grading notes:		

Question 5.47) How many grams of hydrogen will be produced if all the sodium hydroxide reacts?	Standard	5.b, 5.d, 5.e
Response:		
Grading notes:		

Question 5.48) How many grams of hydrogen will actually be produced? Which reactant will be used up completely and which will there still be some left?	Standard	5.e
Response:		
Grading notes:		