(All answers must have the correct # of significant figures in order to receive full credit.)

Exam 2

Chem 130

Spring 2009

Name_____

Date_____

Discussion Section

M-10:00 M-11:00 W-10:00 W-11:00

(2pt) 1. Draw the Lewis dot structure of N_2 below.

http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/LewisDotStructureProblemSet.pdf
http://www.chem.purdue.edu/gchelp/vsepr/ltest1.html
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/DotStructures.pdf
http://grandinetti.org/Teaching/Chem121/Lectures/LewisDot/index.html
http://cost.georgiasouthern.edu/chemistry/general/molecule/lewis.htm

(1pt) 2. Now use your dot structure, and the table given below, to predict the nitrogen-nitrogen bond length in N_2.

Bond length in N_2 is _____1.10 A_____.

	N – N	N = N	N ≡ N
Bond Length	1.47 Å	1.24 Å	1.10 Å

(2pts) 3. If you had 1 mole of $K_2Fe(CN)_6$ how many moles of each of the following elements would you have?

_____2_____K _____1_____Fe

_____6_____C ____6_____N

http://antoine.frostburg.edu/chem/senese/101/compounds/interpret-formulas-quiz.shtml

(2pts) 5. What is the **mass** of 0.243 moles of MgO?

$$MM\ of\ \ MgO = (24.3050 g/mole + 15.9994 g/mole) = \frac{40.3044\, gMgO}{1 moleMgO}$$

$$gMgO = 0.243 molesMgO\left(\frac{40.3044\, gMgO}{1 moleMgO}\right)$$
$$= 9.7939 gMgO$$
$$= 9.79 gMgO$$

http://www.chem.tamu.edu/class/fyp/mathrev/mr-da.html
http://www.ehow.com/how_4505969_calculate-molar-mass.html
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/MolesStochiometryConcentrationsNoImage.ppt.pdf (slides, 6, 12, 13,14)

1 Step Problems-No Partial Credit-2pts Each

8. In the reaction $2P + 3Cl_2 \rightarrow 2PCl_3$, how many **moles of the Cl_2** react when 0.752 moles P react?

answer_____ 1.13 molesCl_2 ____

http://www.chemcollective.org/stoich/reaction_stoi.php
http://www.sciencegeek.net/Chemistry/taters/Unit4Stoichiometry.htm
http://chemistry.about.com/library/weekly/blstoichiometryquiz.htm

9. What is the **mass percent of NaCl** in a solution made by dissolving 20 g of NaCl in 200 g of water?

answer_____ 9.1% ____

http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/percentsppmAndppb.pdf
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/MolarityCalculations3Step.pdf
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/percentppmppbproblems.pdf

10. What is the **molarity of a** 0.2500 L **ethanol solution** made with 3.985 moles of ethanol?

answer_____ 15.94M ethanol _____

http://science.widener.edu/svb/tutorial/molarity.html
http://ths.sps.lane.edu/chemweb/unit6/problems/molarity/
http://lrc-srvr.mps.ohio-state.edu/under/chemed/qbank/quiz/bank3.htm
(**Calculate Molarity - Interesting Substances)**
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/AnswersToOSUMolarityQ.pdf Detailed answer key to many of the questions the online quiz that is listed above.
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/Chem130Quiz2Key.pdf

11. How many **grams of sucrose** are there 500g of a 12% sucrose solution?
answer_____ 60g _____

http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/percentsppmAndppb.pdf
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/MolarityCalculations3Step.pdf
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/percentppmppbproblems.pdf

12. Give the **concentration in ppb** of a sample that contains 0.00022 g of Cd in 3,000 g sample.

answer_____ 73 ppb Cd _____

http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/percentsppmAndppb.pdf
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/MolarityCalculations3Step.pdf
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/percentppmppbproblems.pdf

13. How many **liters of a 1.000 M NaOH solution** do you need in order to get 0.01200 moles NaOH?

answer_____ 0.01200 L _____

http://ths.sps.lane.edu/chemweb/unit6/problems/molarity/
http://www.fordhamprep.org/gcurran/sho/sho/lessons/lesson64.htm
http://science.widener.edu/svb/tutorial/molarity.html

(You must show your work in order to receive credit for the following problems.)

(2pts) 15. A 26 milliliter sample of 0.68 M HCl is diluted with 57 milliliters of water. What is the **molarity of the new solution**? (1000 milliliters=1L)

1. Find # moles of HCl used in to make the dilute solution

$$molesHCl = 26ml\ solution_{(conc.)}\left(\frac{1L}{1000ml}\right)\left(\frac{0.68molesHCl}{1L\ solution_{(conc.)}}\right)$$

$$= 0.01768 moles\ HCl$$

2. Determine total volume of the dilute solution in liters

$$L\,solution_{(dilute)} = (26ml + 57ml)\left(\frac{1L}{1000ml}\right) = 0.083\,L\,solution_{(dilute)}$$

3. Calculate the Molarity of the final solution

$$MHCl_{(dilute)} = \left(\frac{molesHCl}{L\,solution_{(dilute)}}\right) = \left(\frac{0.0176molesHCl}{0.83\,L\,solution_{(dilute)}}\right)$$

$$= 0.213M\ HCl_{(dilutesolution)}$$

(3 pts)16. In the reaction:

$$KClO_3 + 5KCl + 6HNO_3 \rightarrow 6KNO_3 + 3Cl_2 + 3H_2O$$

How many **moles of $KClO_3$** do you need to get 29.00 g of Cl_2?

Known:
$29.00 g Cl_2$
$\frac{3 \text{ mole } Cl_2}{1 \text{ mole } KClO_3}$
$\frac{70.9054 \text{ g} Cl_2}{1 \text{ mole } Cl_2}$

Needed:
moles $KClO_3$

You have a ratio that relates number of moles of $KClO_3$ to the amount of Cl_2. This ratio needs the amount of Cl_2 in moles not in grams, so the molar mass of Cl_2 is needed to make this conversion.
We use a conversion factor that will give us moles of Cl_2 from grams Cl_2. This conversion factor is the molar mass of Cl_2.

1. Find the # of moles of Cl_2

$$29.00 g Cl_2 \left(\frac{1 mole Cl_2}{70.90 g Cl_2} \right) = 0.40903 moles Cl_2$$

2.Calculate the # of moles of $KClO_3$

$$0.40902 moles Cl_2 \left(\frac{1 mole KClO_3}{3 mole Cl_2} \right) = 0.1363 moles KClO_3$$

http://www.chemcollective.org/stoich/reaction_stoi.php
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/SolutionToTheNaHomeworkProblem.pdf
http://chemistry.about.com/library/weekly/blstoichiometryquiz.htm
http://www.sciencegeek.net/Chemistry/taters/Unit4Stoichiometry.htm

(3pts) 17. It is reported that a type of natural remedy has mercury in it. According to a report the concentration of mercury in this remedy is often as high as 32 ppm. If a patient has been using about 12 grams of this remedy per day, how many mg of mercury has she been consuming each day? (1 g =1000mg)

known:
332 ppm Hg

$$\frac{32 \text{ parts Hg}}{1{,}000{,}000 \text{ parts Remedy}}$$

$$\frac{32 \text{ gHg}}{1{,}000{,}000 \text{ g Remedy}}$$

12g Remedy
1000mg
1g

needed:
amount of mgHg/day
How much Hg is in 12g of Remedy

1. To get g Hg/ day convert g/day Remedy to g Hg/day

$$12g\text{Remedy}\left(\frac{32gHg}{1{,}000{,}000g\text{Remedy}}\right) = 3.84\times10^{-4}$$

2. Covert g Hg to mg Hg

$$3.84\times10^{-4}\,gHg\left(\frac{1000mg}{1g}\right) = 3.84\times10^{-1}\,mgHg$$

There are 2 Significant figures so 0.38 mg Hg are consumed each day.

http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/percentsppmAndppb.pdf
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/MolarityCalculations3Step.pdf
http://alpha.chem.umb.edu/chemistry/ch130/seagraves/documents/percentppmppbproblems.pdf