

NAME _____
F2013/CHEM1301/Exam 3/Dooley
October 23, 2013

Multiple Choice: (3 Pts Each) Write the letter corresponding to the correct answer in the blank provided.

- A 1. How many atoms are in 1.00 moles of He?
- A) 6.02×10^{23}
 - B) 1.03×10^{23}
 - C) 4.00
 - D) 3.49×10^{24}
 - E) none of the above

- B 2. How many moles of Cu are in 1.48×10^{25} Cu atoms?
- A) 0.0408
 - B) 24.6
 - C) 1.54×10^{25}
 - D) 6.022×10^{23}
 - E) none of the above

$$1.48 \times 10^{25} \text{ atoms} \left(\frac{1 \text{ mol Cu}}{6.02 \times 10^{23}} \right) =$$

- D 3. One mole of boron has a mass of _____ g.
- A) 9.012
 - B) 6.022×10^{23}
 - C) 5
 - D) 10.811
 - E) none of the above

- C 4. You have 1.0 moles each of Na, C, Pb, Cu and Ne. Which sample contains the largest mass?
- A) Na
 - B) C
 - C) Pb
 - D) Cu
 - E) Ne

$$\begin{array}{l} \text{Na} = 22.99 \text{ g} \\ \text{C} = 12.01 \text{ g} \\ \text{Pb} = 207.2 \text{ g} \\ \text{Cu} = 63.55 \text{ g} \\ \text{Ne} = 20.18 \text{ g} \end{array}$$

- D 5. The mass of one mole of carbon dioxide is _____ g.
- A) 28.01
 - B) 384.4
 - C) 32.00
 - D) 44.01
 - E) none of the above



$$12.01 + 16.00 + 16.00 = 44.01 \text{ g/mol}$$

$$1 \text{ mol CO}_2 = 44.01 \text{ g CO}_2$$

- A 6. The molar mass of Fe_2O_3 is _____ g/mol.
- A) 159.70
 - B) 103.85
 - C) 71.85
 - D) 215.55
 - E) none of the above

- C 7. What is the mass percent of carbon in oxalic acid, $\text{H}_2\text{C}_2\text{O}_4$? (Oxalic acid has a molar mass of 90.04 g/mol)
- $$\frac{2 \times 12.01 \text{ g/mol}}{90.04 \text{ g/mol}} \times 100\% =$$
- A) 2.24%
 - B) 13.3%
 - C) 26.7%
 - D) 34.5%
 - E) none of the above

- E 8. Which of the following is NOT evidence that a chemical reaction has occurred?
- A) color change when chemicals are contacted with each other ✓
 - B) solid formation when chemicals are contacted with each other ✓
 - C) gas formation when chemicals are contacted with each other ✓
 - D) emission of light when chemicals are contact with each other ✓
 - E) All of the above are evidence of a chemical reaction.

- D 9. An electrolyte is:
- A) a ~~solid~~ ionic compound.
 - B) ~~covalent~~ compound dissolved in water.
 - C) a pure ~~covalent~~ compound in the ~~liquid~~ phase.
 - D) an ionic compound dissolved in water. ✓
 - E) none of the above

- A 10. The compound sodium sulfate is soluble in water. When this compound dissolves in water, which ion listed below would be present in solution?
- $$\text{Na}_2\text{SO}_4 \rightarrow 2\text{Na}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$$
- A) SO_4^{2-}
 - B) S^{2-}
 - C) O^{2-}
 - D) Na_2^{2+}
 - E) none of the above

Problems: Work the following problems showing a logical progression of steps.
Answers without work will not receive credit!

1. (5 Points) How many atoms are there in a balloon containing 5.00 g Helium?

$$5.00 \text{ g He} \left(\frac{1 \text{ mol He}}{4.003 \text{ g He}} \right) \left(\frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol He}} \right) = \boxed{7.52 \times 10^{23} \text{ atoms He}}$$

2. (10 Pts) How many grams of Na are there in 15.00g of Na_3PO_4 (MM= 163.94 g/mol)?

$$15.00 \text{ g Na}_3\text{PO}_4 \left(\frac{1 \text{ mol Na}_3\text{PO}_4}{163.94 \text{ g}} \right) \left(\frac{3 \text{ mol Na}}{1 \text{ mol Na}_3\text{PO}_4} \right) \left(\frac{22.99 \text{ g Na}}{1 \text{ mol Na}} \right) = \boxed{6.31 \text{ g Na}}$$

3. (5 Points) A compound has a mass percent of 19.3% for oxygen. Calculate how many grams of oxygen there are in a 48.00 g sample of the compound.

$$48.00 \text{ g CMPD} \left(\frac{19.3 \text{ g O}}{100 \text{ g CMPD}} \right) = \boxed{9.264 \text{ g O}}$$

Balance the following chemical equations. (5 Points Each)



1 Fe \times 2
 6 \times H \neq 6
 6 \times Cl \neq 6



6 C \times 6
 12 H \neq 12
 18 ~~8~~ O \neq 18

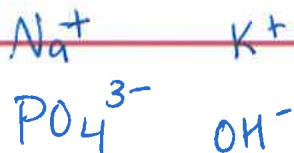
3. Write the reaction that occurs when gas phase elemental chlorine (*Hint: This one might be a diatomic...*) reacts with solid mercury (I) oxide powder to produce liquid dichlorine monoxide and solid mercury (I) chloride powder. *I need formulas and phases, but you don't need to balance the equation.* (10 Pts)



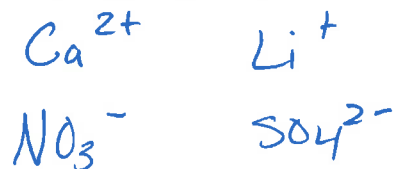
Solubility Rules: Using your solubility rules, determine if the following are soluble or insoluble. (10 Points)

1.	CaI ₂	soluble	2.	AgBr	insoluble
3.	LiOH	soluble	4.	BaS	insoluble soluble
5.	(NH ₄) ₃ PO ₄	soluble			

Precipitation Reactions: Write a chemical equation (doesn't have to be balanced) for the precipitation reaction that occurs (or "No Reaction" if none occurs) when the following pairs of reactants are mixed. (20 Points)



Potential Products	Soluble or Insoluble
NaOH	soluble
K_3PO_4	soluble



Potential Products	Soluble or Insoluble
CaSO_4	insoluble
LiNO_3	soluble

