

# Mole Test Review 2013

## Matching

- Avogadro's number C
- Molar mass A
- Mole D
- Percent Composition E
- Empirical Formula B
- The mass in one mole of any 1 pure substance/  
UNIT: grams/mole \* Molar Mass
- Formula with smallest whole number ratio of elements
- $6.02 \times 10^{23}$
- SI unit for amount of substance
- Percent by mass of each element in a compound

**A. Molar Mass calculations:** Calculate the following molar masses. Show your work!

6.  $\text{MgCl}_2$   
 $\text{Mg } 1(24.3) = 24.3$   
 $\text{Cl } 2(35.5) = 71.0$   
 $95.3 \text{ g/mol}$

7.  $\text{Cr}(\text{OH})_2$   
 $\text{Cr } 1(52) = 52$   
 $\text{O } 2(16) = 32$   
 $\text{H } 2(1) = 2$   
 $86 \text{ g/mol}$

8.  $\text{C}_6\text{H}_{12}\text{O}_6$   
 $\text{C } 6(12) = 72$   
 $\text{H } 12(1) = 12$   
 $\text{O } 6(16) = 96$   
 $180 \text{ g/mol}$

9.  $\text{K}_2\text{S}$   
 $\text{K } 2(39.1) = 78.2$   
 $\text{S } 1(32.1) = 32.1$   
 $110.3 \text{ g/mol}$

10. aluminum sulfite  
 $\text{Al } 2(27) = 54$   
 $\text{S } 3(32.1) = 96.3$   
 $\text{O } 9(16) = 144$   
 $294 \text{ g/mol}$

11. magnesium nitrate  
 $\text{Mg } 1(24.3) = 24.3$   
 $\text{N } 2(14) = 28$   
 $\text{O } 6(16) = 96$   
 $148.3 \text{ g/mol}$

**B. Conversion problems:** Perform the following conversions using dimensional analysis.

(As on the test, write the proper formula first!) Report your answers with the appropriate significant digits.

12. In 25.5 g of Ag, how many moles of silver are present?

$0.23 \text{ moles}$

$25.5 \text{ g} \times \frac{1 \text{ mole}}{107.9 \text{ g}}$   
 $0.23 \text{ moles}$

13. 1100 g of iron III oxide contains how many moles?

$6.8 \text{ mole}$

$1100 \text{ g} \times \frac{1 \text{ mole}}{159.6 \text{ g}}$   
 $6.8 \text{ mole}$

14. What is the mass of 3.25 moles of sulfuric acid ( $\text{H}_2\text{SO}_4$ )?

$318.8 \text{ g}$

$3.25 \text{ mol} \times 98.1 \text{ g/mol}$   
 $318.8 \text{ g}$

15. How many formula units of potassium hydroxide are in 2.55 grams?

$2.7 \times 10^{22} \text{ fu}$

$2.55 \text{ g} \times \frac{6.02 \times 10^{23} \text{ fu}}{56 \text{ g}}$   
 $2.7 \times 10^{22} \text{ fu}$

16. Calculate the number of atoms in 22.6 grams of copper.

$2.14 \times 10^{23} \text{ a}$

$22.6 \text{ g} \times \frac{6.02 \times 10^{23} \text{ a}}{63.5 \text{ g}}$   
 $2.14 \times 10^{23} \text{ a}$

17. Calculate the percent by mass of each element in  $\text{CaCl}_2$ .

$\text{Ca } 1(40) = 40$   
 $\text{Cl } 2(35.5) = 71$   
 $111$   
 $\frac{40}{111} \times 100 = 36\%$   
 $\frac{71}{111} \times 100 = 64\%$



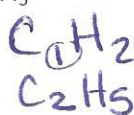
27. What is the empirical formula for a compound that contains 17.34% hydrogen and 82.66% carbon?

a.  $C_5H$

b.  $C_2H_5$

c.  $CH_3$

d.  $CH_2$



Double

$$\frac{17.34}{6.8} = 2.55$$

$$\frac{12}{6.8} = 1$$

28. What is the empirical formula for a compound that is 88.8 % copper and 11.2 % oxygen?

a.  $CuO$

b.  $Cu_2O$

c.  $CuO_2$

d.  $Cu_8O$



$$\frac{63.5}{1.39} = 2$$

$$\frac{16}{0.7} = 1$$

29. The molecular formula for succinic acid is  $C_4H_6O_4$ . What is the empirical formula of the compound?

a.  $C_4H_6O_4$

b.  $C_8H_{12}O_8$

c.  $C_2H_3O_2$

Reduce!

30. A compound with an empirical formula of  $CH_2$  has a molecular mass of 70. What is the molecular formula?



$$\frac{C(12)}{H(2)} = \frac{12}{2} = 6$$

$$\frac{70}{14} = 5$$

a.  $CH_2$

b.  $C_2H_4$

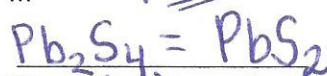
c.  $C_4H_8$

d.  $C_5H_{10}$

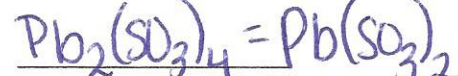
### E. REVIEW CONCEPTS FOR NOMENCLATURE!!!!

31. Write the formulas for ...

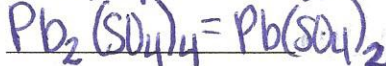
a. lead (IV) sulfide



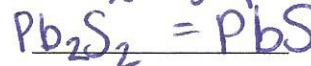
b. lead (IV) sulfite



c. lead (IV) sulfate

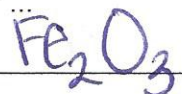


d. lead (II) sulfide

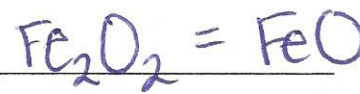


32. What are the formulas for ...

a. iron (III) oxide

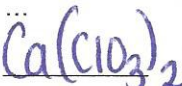


b. iron (II) oxide

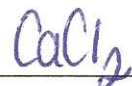


33. Write the formulas for ...

a. calcium chlorate



b. calcium chloride

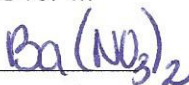


c. calcium chlorite

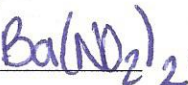


34. Write the formulas for ...

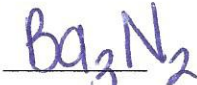
a. barium nitrate



b. barium nitrite



c. barium nitride



35. Halogens are in group 17. Which Halogen has valence electrons in its 5th energy level?

I

36. Which Alkali metal has valence electrons in its 5th energy level?

Rb

37. Alkali metals are in group 1 and have 1 valence electrons. All alkali ions have what charge?

+1

38. Gallium has many valence electrons?

3

What charge does gallium have in compounds?

+3

39. Noble gases are inert, which mean they don't react because they meet the octet. How many valence electrons are required to satisfy the octet?

8

40. Cations lose electrons and have a + charge. Usually they are metals.

41. Anions gain electrons and have a - charge. Usually they are non-metals.