

- D 1. Two samples were weighed using different balances.  
1) 3.529 g      2) 0.40 g      *s.f.*

How should the TOTAL weight of the samples be reported?

- A) 3.929 g    B) 3 g    C) 3.9 g    **D) 3.93 g**    E) 4 g

- A 2. Which of the following pairs could be used to illustrate the Law of Multiple Proportions? *when 2 elements form a series of compounds, the ratio of mass of the 2nd element can always be reduced to small whole #s.*

- A) Au<sub>2</sub>O and Au<sub>2</sub>O<sub>3</sub>**      D) H<sub>2</sub>O and OH<sub>2</sub>  
B) O<sub>2</sub> and O<sub>3</sub>      E) Au<sub>2</sub>O<sub>3</sub> and AuCl<sub>3</sub>  
C) Au<sub>2</sub>O<sub>3</sub> and Fe<sub>2</sub>O<sub>3</sub>

- A 3. Three different samples containing only elements A and B are analyzed:

Sample #1 weighs 24.00 g and contains 3.00 g of B. *12.5% B*

Sample #2 is 12.5% B by weight.

Sample #3 is composed of 11.375 lb of A and 1.625 lb of B. *12.5% B*

It is likely that:

- A) all three samples are identical compounds.**  
B) only samples #1 and #2 are identical compounds; #3 is a different compound.  
C) only samples #2 and #3 are identical compounds; #1 is a different compound.  
D) each of the three samples is a different compound.  
E) at least one of the samples is a mixture.

- A 4. A 2.0000 g sample of element X reacted with oxygen to form 2.5392 g of the compound XO<sub>2</sub>. Taking 16.00 amu for the atomic weight of oxygen, determine the identity of X. *X + O<sub>2</sub> → XO<sub>2</sub>*

- A) Sn**      B) Si      C) Co      D) Ti      E) C       *$\frac{0.5392g O_2}{32g O_2} = \frac{2.0000g X}{Xg X}$*

- A 5. The mass of  $3.01 \times 10^{21}$  atoms of mercury is  
**A) 1.00 g**      D) 200 g  
B) 2.00 g      E) none of these  
C)  $5.00 \times 10^{-5}$  g

$$3.01 \times 10^{21} \text{ atoms} \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ atoms}} \times \frac{200.59g}{1 \text{ mol}} = 1.00g$$

CH 1-4

29  
2  
123  
35.5  
246  
109.04  
110

22.99  
35.45

23  
35.5

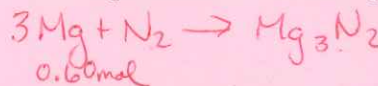
C 6. Which of the following contains the greatest mass of chlorine?

- A) 10.0 g Cl<sub>2</sub> *10.0g Cl<sub>2</sub>*  
 B) 10.1 g NaCl *6.07g Cl*  
 C) 50.0 g KClO<sub>3</sub> *14.5g Cl*  
 D) 0.100 mole NaCl *5.85g*  
 E) 0.100 mole Cl<sub>2</sub> *7g*

87  
+35.5  
122.5

A 7. In the reaction between magnesium and nitrogen to form magnesium nitride, Mg<sub>3</sub>N<sub>2</sub>, 0.6 mole of magnesium would require:

- A) 0.2 mole of N<sub>2</sub> molecules  
 B) 0.4 mole of N<sub>2</sub> molecules  
 C) 0.2 mole of N<sub>2</sub> atoms  
 D) 0.6 mole of N<sub>2</sub> atoms  
 E) 2.4 \* 10<sup>23</sup> molecules of N<sub>2</sub>



B 8. Which contains the greatest quantity of KMnO<sub>4</sub> (FW = 158.0)?

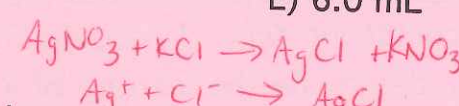
- A) 158 mg KMnO<sub>4</sub> *0.158g 0.001mol*  
 B) 100. mL of 0.100 M KMnO<sub>4</sub> *0.100M = x / 0.100L x = 0.01 mol*  
 C) 0.100 L of 0.0100 M KMnO<sub>4</sub> *0.0100M = x / 0.100L x = 0.001 mol*  
 D) 1.00 mL of 1.00 M KMnO<sub>4</sub> *1.00M = x / 0.001L x = 0.001 mol*  
 E) All of the above contain the same quantity of KMnO<sub>4</sub>

D 9. When AgNO<sub>3</sub> solution is added to a solution of KCl, AgCl is quantitatively precipitated, leaving a solution of KNO<sub>3</sub>. How many milliliters of 0.50 M AgNO<sub>3</sub> would be required to precipitate all of the chloride from 10. mL of 0.40 M KCl?

- A) 2.0 mL  
 B) 4.0 mL  
 C) 5.0 mL  
 D) 8.0 mL  
 E) 6.0 mL

$0.50M = \frac{0.0040 \text{ mol}}{x}$   
 $x = 0.0080 \text{ L}$   
8 mL

$0.40M = \frac{x}{0.010L} = 0.0040 \text{ mol Cl}^-$



E 10. A compound of boron and hydrogen contains 18.9% hydrogen and 81.1% boron. The empirical formula for the compound is

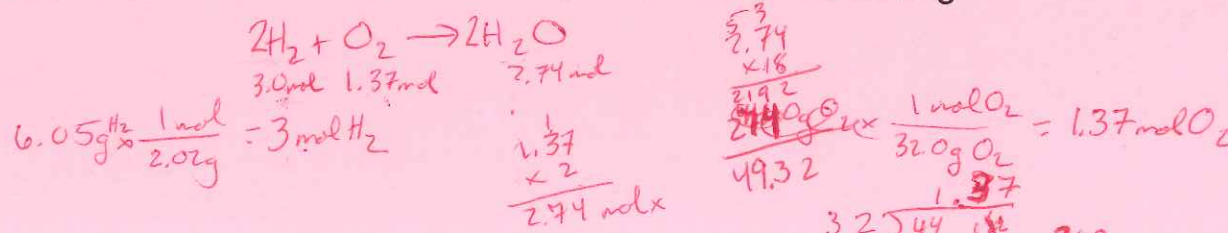
- A) BeH<sub>2</sub> B) Be<sub>2</sub>H C) B<sub>4</sub>H D) B<sub>2</sub>H<sub>2</sub> E) none of these

18.9g

A 11. What is the maximum weight of water that can be obtained by igniting a mixture of 6.05 g of H<sub>2</sub> and 44.0 g of O<sub>2</sub>?

- A) 49.5 g B) 54.0 g C) 27.0 g D) 24.8 g E) 56.0 g

limiting reagent





E 12. A mole of a compound is composed of  $6.02 \times 10^{23}$  atoms of hydrogen, 35.45 g of chlorine and 64.0 grams of oxygen. The formula of the compound is:

- A)  $\text{HClO}_2$     B)  $\text{HOCl}$     C)  $\text{HClO}_3$     D)  $\text{H}(\text{ClO})_2$     E)  $\text{HClO}_4$

C 13. A molecular compound has the empirical formula  $\text{C}_3\text{H}_4\text{OCl}$  (FW=91.52). The molecular weight of the compound could be:

- A) 45.76    D) any of these  
B) 137.28    E) none of these  
C) 183.04

E 14. How many moles of electrons are required per mole of nitrate ion in the half reaction in which  $\text{NO}_3^-$  is reduced to  $\text{NH}_4^+$ ?

- A) 2    B) 3    C) 4    D) 6    E) 8

D 15. The oxidation numbers of bromine in the following list of compounds is (in order of appearance):

$\text{AlBr}_3$ ,  $\text{CaBr}_2$ ,  $\text{HBrO}_3$ ,  $\text{HBrO}$ ,  $\text{Br}_2$

- A) -2, -1, +4, +1, 0    D) -1, -1, +5, +1, 0  
B) -1, -2, -4, -1, -1    E) +3, +2, +5, +1, 0  
C) -3, -2, +5, +1, -1

B 16. Perrhenic acid has the formula  $\text{HReO}_4$ . The formula for the perrhenate ion must be:

- A)  $\text{HReO}_4^-$     B)  $\text{ReO}_4^-$     C)  $\text{ReO}_4^{2-}$     D)  $\text{ReO}_3^-$     E) none of these

B ~~17~~ 17. The total number of moles of chloride ion contained in 1.00 liter each of 0.10 M lithium chloride, 0.10 M copper(II)chloride, 0.10 M iron(III)chloride, and 0.10 M magnesium perchlorate is

- A) 0.40    B) 0.60    ~~C) 0.80~~    D) 1.0    E) none of these

E 18. The oxidation number of sulfur in sodium sulfite is:

- A) 0    B) 1    C) 2    D) 3    E) 4