Name [redacted] First assignment General Chemistry for dentistry

n [redacted] (1)

1	2	3	4	5	6	7
b	a	b	c	a	b	b
8	9	10	11	12	13	14
d	a		b	c	a	c
15	16	17	18			
a	a	b	b			

Part (2)

(1) $25\ g\ Al(NO_3)_3 \times \frac{1\ mol\ Al(NO_3)_3}{(26+9\times16+3\times14)\ g\ Al(NO_3)_3} \times \frac{3\ mol\ N}{1\ mol\ Al(NO_3)_3} \times \frac{14\ g\ N}{1\ mol\ N}$.

$= 4,952\ g\ N_2$.

(2)

(a) ...number of mol of $AgNO_3$ = MV → volum = $,33\times10^{-3}\times26$
(molarity)

$= 8,58\times10^{-3}\ mol\ AgNO_3$

number of mol of NaCl = MV = $50\times10^{-3}\times,25 = ,0125$ mol of NaCl

...then we calculate the Number of mol of product

$AgNO_3 + NaCl \rightarrow AgCl_{(s)} + NaNO_{3(aq)}$

number of mol of AgCl

$= 8,58\times10^{-3}\ AgNO_3 \times \frac{1\ mol\ AgCl}{1\ mol\ AgNO_3} = 8,58\times10^{-3}\ AgCl$

number of mol of AgCl = ,0125 mol of $\frac{NaCl \times 1\ mol\ AgCl}{NaCl}$

$= ,0125\ mol\ AgCl$

,0125

the limiting reactant $AgNO_3$

b the concentration of ~~reactant~~ $\frac{12.5\times10^{-3} - 8.58\times10^{-3}}{12.5\times10^{-3} + 8.58\times10^{-3}}$

$= 18.95\%$ of ~~AgCl~~ NaCl

c the theoretical is 8.58×10^{-3} mol of AgCl $\times \frac{35.45 + 107.87 \text{ AgCl}}{1 \text{ mol of AgCl}}$

$= 1.258 g$

d the percentage yield $\frac{\text{actual yield}}{\text{theorical yield}} \times 100\%$

$= \frac{.980}{1.2555} \times 100\% = 78.05\%$

[3] Presenta of Ca is $\frac{3 \text{ mol Ca}}{1 \text{ mol } Ca_3(PO_4)_2} \times \frac{40.08 \text{ g Ca}}{(40.08\times3)+(8\times16)+(30.97\times2)}$

$= 38.76\%$

$P = \frac{2 \text{ mol of P}}{1 \text{ mol } Ca_3(PO_4)_2} \times \frac{30.97 \text{ g of P}}{(30 \text{ g of P} \times 2) + (8\times16)\,O + (3\times40.08)\,Ca_3(PO_4)_2}$

19.96%

$O = \frac{8 \text{ mol of O}}{1 \text{ mol } Ca_3(PO_4)_2} = \frac{8\times16}{\text{mas of } Ca_3(PO_4)_2}$ ~~.2051622×100~~ ~~= 5.16%~~

$\% 41.29$

then the molecular formula is $C_{20}H_{24}N_2O_2$

(6) $2NaN_3 \longrightarrow 2Na_{(s)} + 3N_{2(g)}$

50L

$\frac{2\ mol\ NaN_3}{3\ mol\ N_2} \times 50L\ N_2$

$50L\ N_2 = 50L\ N_2 \times \frac{1\ mol\ N_2}{22,4L} = 2,23\ mol\ N_2$

2 mol NaN_3 ⟶ 3 mol N_2

??? ⟶ 2,23

1,48 mol of NaN_3

1,48 mol of $NaN_3 \times \frac{1\ mol\ NaN_3}{64,99g\ NaN_3}$

1,48 mol of $NaN_3 \times \frac{65g\ NaN_3}{1\ mol\ NaN_3}$ = 96,18 g of NaN_3

(2) 50g of Sodium.

$50 \times \frac{1\ mol\ Na}{22,99} = 2,173\ mol$ of Na

2 Na ⟶ $3N_2$

2,173 ⟶ ??? 3,2608 mol of N_2

1 mol ⟶ 22,4 liter 73,043 L of N_2

3,2608 mol ⟶ ???

= 0,125 2485 x 2 = (1) (9)

(4) ~~Citron~~ → 1,841g of C

,206 of H

2,453 of O

the number of mol of C = $1,841g \times \frac{1mol\,C}{12} = \frac{,1534}{,153} = 1 \times 3 = 3$

the number of mol of H = $,206g \times \frac{1mol\,H}{1} = \frac{,206}{,153} = 1,34 \times 3 = 4$

the number of mol of O = $2,453g \times \frac{1mol\,O}{16} = \frac{,1533}{,1533} = 1 \times 3 = 3$

the emperical is $C_3O_3H_4$

$$\frac{\text{molar mas}}{\text{empirial molar mas}} \quad \frac{1.76}{(3\times12 + 16\times3 + 4)} = 2$$

the molecular formula is $C_6O_6H_8$

(5) ~~74,03~~ →

we suppost that we have 100 g of material

the number of mol of C = $74,03g \times \frac{1mol\ of\ C}{12g\ of\ C} = \frac{6,169\ mol}{,61625} = 10$

the number of mol of H = $7,47g \times \frac{1mol\ of\ H}{1g\ of\ H} = \frac{7,47\ mol}{,6162} = 12,1$

the number of mol of N = $8,643 \times \frac{1mol\,N}{14\ g\ of\ N} = \frac{,617}{,66} = (1)$

the number of mol of O = $9,865 \times \frac{1mol\,O}{16g\,O} = \frac{,6162}{,616} (1)$

the emperial formula is $C_{10}H_{12}NO$

the molecular formula i $\frac{\text{molar mas}}{\text{empirial molar mas}} = \frac{325}{127(12\times10)+16+14} = 2$

① chosse the correct answer.

① $(8 + 8 \times 1) + (4 \times 16) + 32$

$\frac{64}{132} \times 64 = 31$ ⓑ 30.7

② ⓐ

③ $Ba_3(PO_4)_2 \Rightarrow 3Ba^{+2} + 2(PO_4)^{-3}$

ⓑ

④ c

⑤ a

⑥ ⓑ

⑦ $2NH_4^{+} + SO_4^{-2}$ ⓑ

⑧ d

⑨ $3,32 g \times 10^{-5} g \; Cf \times \frac{1 mol}{242,06} = 1,37 \times 10^{-7}$ ⓐ

⑩

⑪ $78,92 \times \frac{S}{100} + \frac{S - 100}{100} \times 80,92 = 79,90$

$S,7892 + 80,92 + S,8092 = 79,90$

$1 = S$ ~~$.S4,5984 = / 160,82$~~

$.S - ,02 = 1,02 -$

ⓑ 49% = الأخرى ∴ $\%\underline{51} = S$

⑫ $1,3 \times 10^{12} \times (,15)$

$1,3 \times 10^{12} \rightarrow ,15$ $1,538 \times 10^{-11}$

$1 \rightarrow S$

~~$1,538 \times 10^{-11} g \times \frac{1 mol}{55,85 g} \times \frac{6,022 \times 10^{23} aion}{1 mol}$~~

ⓒ $10 \times 1,24$

⑬ $52,2 \times \frac{1 mol}{12}$ $\frac{4,35}{4,35} = 1 \times 2 = 2$

$13 \times \frac{1 mol}{1} = \frac{13 mol}{4,35}$ $2,9885 \times 2 = \underline{6}$ H_6C_2O

$\frac{34 \times mol}{16} = \frac{2,125}{4,125}$ $,485 \times 2 = ①$ ⓐ

(13) n = (3) 3d (c)

~~4p~~ - ~~4d~~

3s 3d 5s

(ss)p(s)p(s)dp(s)dps fdps

4p.

(15) ~~3s~~ 3d

~~6s~~ 4p (a)

16 6 6p (a)

(17) 2p 3p

b 5s 4f (b)

spdf.

18 n = 4level sspsps dps dps fdp s

(b) 4

First assignments 1st 2012-13 General chemistry for dentistry

Name: Amjad Al karrri

Part II: Choose the most correct answer

1. Determine % by weight of oxygen in 64.00 g of $(NH4)_2(SO4)$.
   a. 48.5% b. 30.7% c. 36.2% d. 79.0%

2. An atom becomes an anion if it
   a. Gains electron b. Loses electron c. Shares electrons d. (a) and (b)

3. Identify the ions in $Ba_3(PO_4)_2$
   a. Ba^{2+}, P^{3-}, and O^{2-}
   b. $3Ba_2^{2+}$ and $2PO_4^{3-}$
   c. $2Ba^{+}$ and PO_4^{3-}
   d. $2Ba^{2+}$ and $3(PO_4)^{3-}$

4. An atom containing which one of the following is an isotope of carbon?
   a. 6 neutrons and 7 protons
   b. 12 neutrons and 12 protons
   c. 7 neutrons and 6 protons
   d. 13 neutrons and 13 protons

5. In a chemical reaction, the chemicals one starts with are called the:
   a. Reagents b. Reacting chemicals c. Products d. All of the above

6. An atom becomes a cation if it
   a. Gains electron b. Loses electron c. Shares electrons d. Both of a and b

7. Identify the ions in $(NH_4)_2SO_4$
   a. N^{3-}, H^{+}, S^{2-}, and O^{2-}
   b. $2NH_4^{+}$ and $(SO_4)^{2-}$
   c. NH_2^{2+} and H_2SO_4
   d. NH_4^{+} and $(SO_4)^{-}$

8. What is the mass number of an atom of nitrogen that has 8 neutrons?
   a. 8 b. 7 c. 14 d. 15

9. How many moles are in 3.32×10^{-5} g of the element Californium (Cf)?
   TIP: This element belongs to the "Actinides" row of the periodic table.
   a. 1.32×10^{-7} b. 9.81×10^{-5} c. 2.22×10^{-6} d. 5.14×10^{-4}

10. In which of the following pairs do the ions have the same number of electrons?
    a. H^{+} and H^{-} b. Fe^{3+} and Ca^{2+} c. Ba^{+2} and Na^{+1} d. F^{-} and Cl^{-}

11. Bromine (Br) has two isotopes, with masses of 78.92 and 80.92 amu. What is the natural abundance of the heavier isotope?
    a. 53% b. 49% c. 13% d. 68%

12. In the blood of an infant there are about 1.3×10^{12} red blood cells, which contain a total of 0.15 g of iron ions. On the average, how many iron ions are present in each red blood cell of an infant? NOTE: to solve this problem consider the atomic weight of an iron ion to be the same as the atomic weight of elemental iron.

a. 8.8×10^{23} b. 4.7×10^{13} c. 1.2×10^{9} d. 3.0×10^{8}

13. What is the empirical formula of an unknown compound that contains 52.2% carbon, 13.0% hydrogen and 34.8% oxygen?

a. C_2H_6O b. C_3H_8O c. C_2H_5OCl d. $C_5H_{10}O$

14. The set of quantum numbers, $n = 3$, $l = 2$, $m_l = 0$

a. is not allowed
b. describes an electron in a 2d
c. orbital describes one of five orbitals of a similar type
d. describes an electron in a 3p orbital

15. Four electrons in an atom have the quantum number given below. Which electron is at the highest energy?

a. $n=3, l=0, m_l=0, m_s=-1/2$ c. $n=3, l=2, m_l=-2, m_s=+1/2$
b. $n=5, l=0, m_l=+1, m_s=+1/2$ d. $n=4, l=1, m_l=-1, m_s=-1/2$

16. Identify the subshell in which electrons with the quantum numbers $n = 6$, $l = 1$ may be found.

a. 6p b. 6f c. 6d d. 5p

17. Which of the following sets of quantum numbers is not allowed?

a. $n = 2, l = 1, ml = 0$ c. $n = 3, l = 2, ml = -1$
b. $n = 3, l = 0, ml = -1$ d. $n = 4, l = 3, ml = -1$

18. What is the total number of orbitals in the n = 4 level?

a. 8 b. 16 c. 32 d. 12
b. 4

Part II: Solve the following problems: Show all your calculations.

[1]. What is the mass of nitrogen in 25.0 g of $Al(NO_3)_3$?

[2]. If 26 mL of 0.33 M $AgNO_3$(aq) are reacted with 50 mL of 0.25 M NaCl(aq),

a. What is the limiting reactant

$AgNO_3 + NaCl \longrightarrow AgCl + NaNO_3$

V = 0.026 L | V = 0.05 L
M = 0.33 | M = 0.25
#moles = 8.58×10^{-3} | #moles = 0.0125

① $AgNO_3$ is the limiting reactant

(b) 1 mole $AgNO_3$ ⟶ 1 mole NaCl

8.58×10^{-3} ⟶ PP(8.58×10^{-3})

# of moles of NaCl remaining without reacting = $0.0125 - 8.58 \times 10^{-3} = 3.92 \times 10^{-3}$ mole NaCl

$* \frac{3.92 \times 10^{-3}}{0.026 + 0.05} = 0.051\ M$

(c) 1 mol $AgNO_3$ → 1 mol NaCl

$8.58 \times 10^{-3} \rightarrow 8.58 \times 10^{-3}$ mol

mass = $8.58 \times 10^{-3} \times 143.3 = 1.22951$ g

b. what is the concentration of the remaining unreacted species at the end of the reaction?

c. What is the theoretical yield of the $AgCl(s)$ that can be precipitated from the reaction.

d. If the actual AgCl(s) was 0.980 g, what is the percentage yield?

$\frac{98}{1.229} \times 100 = 79.6\%$

[3]. What is the percent composition of Ca, P, and O in rust, $Ca_3(PO_4)_2$? (Express each percentage to 4 sig figs.)

310

Ca = 38.71%

P = 20.00%

O = 41.29%

[4]. Ascorbic acid is a hydrocarbon derivative, a compound that consists of carbon, hydrogen, and oxygen. A 4.500-g sample of ascorbic acid was analyzed and found to contain 1.841 g of carbon and 0.206 g of hydrogen. If ascorbic acid has a molar mass of 176 g/mol, determine both the empirical formula and the molecular formula for ascorbic acid.

[5]. Quinine is used as an antimalarial drug. An analysis of quinine Indicates the compound consists of 74.03% carbon, 7.47% hydrogen, 8.64% nitrogen, and 9.86% oxygen. If quinine's molar mass is 325 g/mol, determine the empirical and molecular formulas for quinine.

[6]. An automobile airbag inflates when N_2 gas results from the explosive decomposition of sodium azide (NaN3),

i. $2\ NaN_3\ (s) \rightarrow 2\ Na\ (s) + 3\ N_2\ (g)$

a. Calculate the mass of NaN_3 needed to produce 50.0 L of N_2 gas at STP.

b. Calculate the volume of nitrogen gas produced when 50.0 g of sodium are produced at STP.

(4) 1.841 g C, 0.206 g H, ascorbic ← mass = 4.500 g; molar mass = 176 g/mol

mole of C = $\frac{1.841}{12} = 0.1534$ mol C

mole of H = $\frac{0.206}{1} = 0.206$ mol H

mole of O = $\frac{4.5 - (1.841 + 0.206)}{16} = 0.1533$ mol O

$\frac{0.1534}{0.1533} = 1$ C / $\frac{0.2815}{0.1533} = 1$ O / $\frac{0.206}{0.1533} = 1.34$ H ⟶ ×3

3 3 4

$C_3H_4O_3$ → empirical

molecular formula = $\frac{176}{(3 \times 12 + 4 + 3 \times 16)} = 2$

$C_6H_8O_6$

Q5

* 74.03% C
* 7.47% H
* 8.64% N
* 9.86% O

* molar mass of Compound is 325 g/mol

$\frac{74.03}{12} = 6.169$ mole (C) | $\frac{8.64}{14} = 0.617$ mole (N) ⟹ ÷ 0.6162

$\frac{7.47}{1} = 7.47$ mole (H) | $\frac{9.86}{16} = 0.6162$ (O)

N → 1 , C → 10 , O → 1 , H → 12 ⟹ $C_{10}H_{12}NO$ (empirical)

molar mass = 162 g/mol

$\frac{325}{162} = 2$ ⟹ $C_{20}H_{24}N_2O_2$ شكلو بخوف

Q6

هذا السؤال غريب

Amjad Al-Karrifi