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**CHM 101 ASSIGNMENT ANSWERS**

1

First what is a Positron? It is a positively charged particle of antimatter that has the same mass and spin of an electron.

1. Proton changes to neutron with the emission of a positron given as:
2. carbon-10C decays to positron emission to give the following equation:

The product formed was Boron

2

In an experiment carried out by Taylor and Krist, no explicit molar conc. are given but we do know that for every a mole of HI, 0.233n mole of each product is formed and (1-0.233) n = 0.777n mole of HI remains.

 0.777n mole of HI was dissociated

 Kc = = = 0.0899

3

(a) K =

 a = 46.1

|  |  |  |  |
| --- | --- | --- | --- |
| Time(mins) | 5 | 10 | 20 |
| Vol() | 37.1 | 29.8 | 19.6 |

 =

 =

 Average = = 0.0432, Since = ; k= 0.0432 = 16.04 *seconds*

3b.

Solution

 =

 K = = =

 x 800 =

 =1.112

 = 1.112

 =

 = 3

*a= 3a -3x*

x =

= = 66.6%

That means 66.6% has reacted after 800 seconds

4a.

 First what is a buffer solution? A buffer solution of weak acid or base and its corresponding conjugate, it could be conjugate acid or conjugate base that resist changing even with the introduction of another acid or base.

 Henderson-Hasselbalch equation for a base buffer system:

 pOH = p + log ()

(b) For acetic acid is 1.8x1

Acetic acid, C is a weak acid which ionizes partially and sodium is a string electrolyte which ionizes completely in the solution. Let x be the number of moles of acetic acid ionized.

Then, the concentrations of various species are:

C +

C

The conc. of acetate ions from acetic acid = *x*

*Since sodium acetate completely ionized*

The conc. of acetate ion from sodium acetate = 0.1M

Therefore, total [ = 0.15 + *x*

Concentration of acetic acid left unionized = 0.2 – *x*

[

[C = 0.2 – *x* = 0.2 mol

Ionization constant,

 =

For acetic acid is 1.8x1 (already given)

1.8x1] x

] = 1.8x1

] = 2.4 x 1

To find the pH

pH = -log

pH = -log[2.4 x 1

pH= 4.62

*(c) To find the buffer solution with high capacity*

*5*

1. *(i)* 2Al + Fe2O3 Al2O3 + 2Fe
 *2 moles* *1 mole*

 *n =*

 *2 moles of Al produces 1 mole of* Al2O3*4.59 moles of produces x*

*x =  of* Al2O3

*Therefore,*

*2.295 moles =*

*2.295moles* x 2(27) + 3(16) = *m*

*m* = 2.295(102)

= 234.09 *g*

*(ii) To find h*ow much of the excess reagent is left at the end of the reaction

We calculate the no of moles of 601g of Fe2O3

*n = of* Fe2O3

*Therefore, Al would be the limiting reagent of the reaction*

Fe2O3 would be the excess reagent of the reaction

Therefore, mole ofFe2O3 will produce 1 mole of Al2O3

Therefore, the moles of Fe2O3 that would be used is 2.295 moles

Recall the reaction has  *of* Fe2O3

*Therefore to find the reagent left,*

*Reagent left = 3. 765 – 2.295 = 1.47 moles*

*to find the mass*

*Mass = no of moles* x *molar mass*

*no of moles= 1.47 moles*

*Molar mass=*

*Mass = 1.47* x *159.6 =234.6* g

The mass of the excess reagent is 234.6g

 (b)

 *1 mole of = 1 mole of*

 *Mass of benzene = 78g*

 *Mole of benzene = = 0.513 mole of benzene*

 *Mass of*

 *Theoretical yield of*

 *%* yield = x100; actual mass= 46g

 = 79.71%

 *(c)*

 *1 mole of --- 3 moles of*

 *40g of --- 132g of*

***1*** *---* ***x***

1*g of*  ---- of

 120*g of*  ---- x 120 of

 ***= 396 of C***

*(d)* Elements in the periodic table can be classified into four distinct classes based on their electronic configuration?

Answer: Elements in modern periodic table are classified into four classes based on their electronic configuration which are s, p, d and f block

S block elements are the elements which last electron enters in the s orbital in outermost shell. General outer shell electronic configuration of these elements is ***ns where n (varies from 1-7) and s(varies 1-2) e.g. 1s2 or 6s1***

P block elements are the elements which the last electron enters the p orbital in the outermost shell. General outer shell electronic configuration of these elements in ***np where n (varies from 2- 7) and s (varies 1-6) e.g. 2p2 or 5p6***

D block elements are the elements which the last electron enters the d orbital in the outermost shell. General outer shell electronic configuration of these elements in ***nd where n (varies from 3- 6) and s (varies 1-10) e.g. 4d2 or 6d9.*** This group is for the transition element

F block elements are the elements which the last electron enters the f orbital in the outermost shell. General outer shell electronic configuration of these elements in ***nf where n (varies from 4- 5) and s (varies 1-14) e.g. 4f10 or 5f11***

6. Always protect your eyes with goggles with side of shields when working in the laboratory.

7. We record our readings immediately to prevent lose of recorded data\readings.

8. A solid has a mass of 8.47g and volume of 3.24*c*

 Solution

 Mass of the solid = = 8.47x

Volume of the solid = = 3.24x1

 Density =

 = 0.261 *kg*

9. BaCl2 + H2SO4 BaS+ 2HCl

 Solution

 n =CV; C= 0.250M, V=5xd

 n= 0.250x5x1 = 1.25x1

 n= 1 moles of H2SO4

Since 1 mole of H2SO4 ---- 1 mole of BaS

To calculate the mass of BaS= no of moles x molar mass

To find the molar mass= (137.33+32+ (16x4)) = 233.33

Mass = 1.25x1 of BaS

10) To find the percentage of water in an hydrate

*%* of

 = 11.3*g*

 = 25*g*

*%* of

= 45.2% of