

# Some Basic Concepts of Chemistry JEE Main PYQ - 2

Total Time: 25 Minute

Total Marks: 40

## Instructions

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1. Test will auto submit when the Time is up.
2. The Test comprises of multiple choice questions (MCQ) with one or more correct answers.
3. The clock in the top right corner will display the remaining time available for you to complete the examination.

### Navigating & Answering a Question

1. The answer will be saved automatically upon clicking on an option amongst the given choices of answer.
2. To deselect your chosen answer, click on the clear response button.
3. The marking scheme will be displayed for each question on the top right corner of the test window.

## Some Basic Concepts of Chemistry

1. 1 gram of a carbonate ( $M_2CO_3$ ) on treatment with excess  $HCl$  produces 0.01186 mole of  $CO_2$ . The molar mass of  $M_2CO_3$  in  $g\ mol^{-1}$  is : (+4, -1)

- a. 118.6
- b. 11.86
- c. 1186
- d. 84.3

[13-Apr-2023-shift-2]

2. Excess of  $NaOH_{(aq)}$  was added to 100 mL of  $FeCl_3$  (aq) resulting into 2.14 g of  $Fe(OH)_3$ . The molarity of  $FeCl_3$  (aq) is : (Given molar mass of  $Fe = 56\ g\ mol^{-1}$  and molar mass of  $Cl = 35.5\ g\ mol^{-1}$ ) (+4, -1)

- a. 0.2 M
- b. 0.3 M
- c. 0.6 M
- d. 1.8 M

[8-Apr-2017-Online]

3. The amount of arsenic pentasulphide that can be obtained when 35.5 g arsenic acid is treated with excess  $H_2S$  in the presence of conc.  $HCl$  (assuming 100% conversion) is : (+4, -1)

- a. 0.50 mol
- b. 0.25 mol
- c. 0.125 mol
- d. 0.333 mol

[9-Apr-2016-Online]

4. 3 g of activated charcoal was added to 50 mL of acetic acid solution (0.06 N) in a flask. After an hour it was filtered and the strength of the filtrate was (+4, -1)

found to be  $0.042 N$ . The amount of acetic acid adsorbed (per gram of charcoal) is

[2015]

- a. 18 mg
- b. 36 mg
- c. 42 mg
- d. 54 mg

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5. 5 moles of  $AB_2$  weigh  $125 \times 10^{-3} \text{ kg}$  and 10 moles of  $A_2B_2$  weigh  $300 \times 10^{-3} \text{ kg}$ . (+4, -1)  
The molar mass of  $A(M_A)$  and molar mass of  $B(M_B)$  in  $\text{kg mol}^{-1}$  are :

- a.  $M_A = 50 \times 10^{-3}$  and  $M_B = 25 \times 10^{-3}$  [12-Apr-2019(I)]
- b.  $M_A = 25 \times 10^{-3}$  and  $M_B = 50 \times 10^{-3}$
- c.  $M_A = 5 \times 10^{-3}$  and  $M_B = 10 \times 10^{-3}$
- d.  $M_A = 10 \times 10^{-3}$  and  $M_B = 5 \times 10^{-3}$

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6. 50 mL of 0.5 M oxalic acid is needed to neutralize 25 mL of sodium hydroxide (+4, -1)  
solution. The amount of  $NaOH$  in 50 mL of the given sodium hydroxide  
solution is :

[12-Jan-2019-(I)]

- a. 40 g
- b. 20 g
- c. 80 g
- d. 4 g

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7. A 10 mg effervescent tablet containing sodium bicarbonate and oxalic acid (+4, -1)  
releases 0.25 ml of  $CO_2$  at  $T = 298.15 \text{ K}$  and  $p = 1 \text{ bar}$ . If molar volume of  $CO_2$   
is 25.0 L under such condition, what is the percentage of sodium bicarbonate  
in each tablet ? [Molar mass of  $NaHCO_3 = 84 \text{ g mol}^{-1}$ ]

[11-Jan-2019-(I)]

- a. 16.8
- b. 8.4
- c. 0.84
- d. 33.6

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8.  $A + 2B + 3C \rightleftharpoons AB_2C_3$  Reaction of 6.0 g of A,  $6.0 \times 10^{23}$  atoms of B, and 0.036 mol of C yields 4.8 g of compound  $AB_2C_3$ . If the atomic mass of A and C are 60 and 80 amu respectively, the atomic mass of B is (Avogadro no. =  $6 \times 10^{23}$ ): (+4, -1)

[11-Apr-2015-Online]

- a. 70 amu
- b. 60 amu
- c. 50 amu
- d. 40 amu

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9. 0.5 gm of an organic compound with 60% Carbon produce \_\_\_\_\_ gm of  $CO_2$  upon complete combustion (+4, -1)

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10. A sample of a hydrate of barium chloride weighing 61 g was heated until all the water of hydration is removed. The dried sample weighed 52 g. The formula of the hydrated salt is : (atomic mass,  $Ba = 137 \text{ amu}$ ,  $Cl = 35.5 \text{ amu}$ ) (+4, -1)

- a.  $BaCl_2 \cdot H_2O$
- b.  $BaCl_2 \cdot 2H_2O$
- c.  $BaCl_2 \cdot 3H_2O$
- d.  $BaCl_2 \cdot 4H_2O$

[10-Apr-2015-Online]

## Answers

### 1. Answer: d

#### Explanation:



$$n_{M_2CO_3} = n_{CO_2}$$

$$\frac{1}{M_{M_2CO_3}} = 0.01186$$

$$M_{M_2CO_3} = \frac{1}{0.01186}$$

$$= 84.3 \text{ g/mol}$$

#### Concepts:

### 1. Some Basic Concepts of Chemistry:

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- Chemistry is a core branch of science that explains us about the various compositional properties and interaction of **matter**. It also helps to understand various **chemical reactions**.
- Chemistry is important in order to understand the behaviour of **fertilizers**, alkenes, acids, salts, dyes, **polymers**, drugs, soaps and alloys in organic and **inorganic chemistry**.
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Read More: [Some Basic Concepts of Chemistry](#)

## Classification of Matter

There are two ways of classifying the matter:

### (A) Physical Classification:

Matter can exist in three physical states:

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2. Liquids – have definite volume but not definite shape.
3. Gases – have neither definite volume nor definite shape.

## (B) Chemical Classification:

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1. **Pure Substances** are defined as a single substance (or matter) which cannot be separated by simple physical methods. Pure substances can be further classified as (i) Elements (ii) Compounds
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## 2. Answer: a

### Explanation:



100 ml 2.14 gm

m = ?

$$\text{Moles of Fe}(\text{OH})_2 = \frac{2.14}{107} = 2 \times 10^{-2} \text{ mol}$$

$$\text{moles FeCl}_2 = 2 \times 10^{-2} \text{ mol}$$

$$M = \frac{2 \times 10^{-2}}{100} \times 1000 = 0.2 \text{ M}$$

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### 3. Answer: c

#### Explanation:



2 moles of Arsenic Acid – > 1 mole of Arsenic Pentasulphide

1 moles of Arsenic Acid – > 1/2 mole of Arsenic Pentasulphide

$$\frac{\text{Molar mass of } H_3AsO_4=141}{\text{Molar mass of } As_2S_5=308} \text{ number of moles of } H_3AsO_4 = \frac{35.5}{141} = 0.25$$

$$\therefore \text{ number of moles of } As_2S_5 = \frac{0.25}{2} = 0.125 \text{ mol}$$

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#### 4. Answer: a

#### Explanation:



50 ml

$$m. \text{ moles} = 50 \times 0.06 = 3$$

$$m. \text{ moles left} = 50 \times 0.042 = 2.1$$

$$m. \text{ moles absorbed} = 0.9$$

$$\begin{aligned} \text{mass absorbed} &= \frac{0.9 \times 10^{-3} \times 60}{3} \times 10^3 \\ &= \frac{54}{3} = 18 \text{ mg} \end{aligned}$$

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#### 5. Answer: c

#### Explanation:

$$5[M_A + 2M_B] = 125$$

$$M_A + 2M_B = 25 \dots(1)$$

$$2M_A + 2M_B = 30 \dots(2)$$

from e (1) & (2)

$$M_A = 5$$

$$M_B = 10$$

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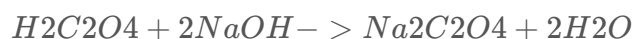
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6. Answer: d

Explanation:



$$m_{eq} \text{ of } H_2C_2O_4 = m_{eq} \text{ NaOH}$$

$$50 \times 0.5 \times 2 = 25 \times M_{NaOH} \times 1$$

$$\therefore M_{NaOH} = 2M$$

$$\text{Now } 1000 \text{ ml solution} = 2 \times 40 \text{ gram NaOH}$$

$$\therefore 50 \text{ ml solution} = 4 \text{ gram NaOH}$$

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## 7. Answer: b

### Explanation:



Here, number of moles of  $CO_2 = \frac{0.25 \times 10^{-3}}{25.9} \approx 10^{-5}$

Now, one mole of  $CO_2$  is produced by one mole of  $NaHCO_3$ .

$\therefore$  the number of moles of  $NaHCO_3$  in the given reaction = number of moles of  $CO_2 = 10^{-5}$

Now, the weight of  $NaHCO_3 = 10^{-5} \times 84$

$$= 84 \times 10^{-5} g$$

$$\therefore \% \text{ Mass} = \frac{84 \times 10^{-5}}{10 \times 10^{-3}} \times 100$$

$$= 8.4\%$$

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### 8. Answer: c

#### Explanation:

Atomic mass of  $A = 60$  and atomic mass of  $C = 80$



Here  $C$  is the limiting reagent, hence,  $0.036 \text{ mol}$  of  $C$  will completely consume  $\frac{0.036}{3} = 0.012 \text{ mol}$  of  $AB_2C_3$  and will form  $4.8 \text{ gm mol}$  of

$$\begin{aligned}(AB_2C_3) &= \frac{\text{mass}}{\text{mol. mass}} \\ 0.012 &= \frac{4.8}{60 + M_B \times 2 + 80 \times 3} \\ \Rightarrow 300 + 2M_B &= \frac{4.8}{(0.012)} = 400 \\ \Rightarrow 2M_B &= 100 \\ \Rightarrow M_B &= 50 \text{ amu}\end{aligned}$$

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## 9. Answer: 1.1 – 1.1

### Explanation:

The correct answer is 1.1

$$\text{Moles of Carbon} = \frac{(0.5 \times 0.6)}{12}$$

$$\text{Moles of } CO_2 = \frac{(0.5 \times 0.6)}{12}$$

$$\text{Moles of } CO_2 = \frac{(0.5 \times 0.6)}{12} \times 44$$

$$\text{Moles of } CO_2 = 1.1gm$$

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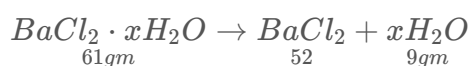
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## 10. Answer: b

### Explanation:



52 gm  $CaCl_2$  combines with 9 gm  $H_2O$

208 gm  $BaCl_2$  combines with 36 gm  $H_2O$

$$n_{H_2O} = \frac{36}{18} = 2$$

So the formula will be,  $BaCl_2 \cdot 2H_2O$

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