Some Basic Concepts of Chemistry JEE Main PYQ - 2

Total Time: 25 Minute **Total Marks:** 40

Instructions

Instructions

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)**

[13-Apr-2023-shift-2]

a. 118.6

b. 11.86

c. 1186

d. 84.3

---

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)**

[8-Apr-2017-Online]

a. $0.2\,M$

b. $0.3\,M$

c. $0.6\,M$

d. $1.8\,M$

---

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)**

[9-Apr-2016-Online]

a. 0.50 mol

b. 0.25 mol

c. 0.125 mol

d. 0.333 mol

---

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

---

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

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 $M_B = 5 \times 10^{-3}$

---

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

[12-Jan-2019-(I)]

a. 40 g

b. 20 g

c. 80 g

d. 4 g

---

7. A $10\,mg$ effervescent tablet contianing sodium bicarbonate and oxalic acid releases $0.25\,ml$ of CO_2 at T = $298.15\,K$ and $p = 1$ 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 $NaHCO_3 = 84\ g\ mol^{-1}$] **(+4, -1)**

[11-Jan-2019-(I)]

a. 16.8

b. 8.4

c. 0.84

d. 33.6

---

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

---

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

---

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, $Ba = 137\,amu. Cl = 35.5\,amu$) **(+4, -1)**

[10-Apr-2015-Online]

a. $BaCl_2 \cdot H_2O$

b. $BaCl_2 \cdot 2H_2O$

c. $BaCl_2 \cdot 3H_2O$

d. $BaCl_2 \cdot 4H_2O$

Answers

1. **Answer: d**

Explanation:

$$M_2CO_3 + 2HCl \rightarrow 2MCl + H_2O + CO_2$$
$$n_{M_2CO_3} = n_{CO_2}$$
$$\frac{1}{M_{M_2CO_3}} = 0.01186$$
$$M_{M_2CO_3} = \frac{1}{0.01186}$$
$$= 84.3\, g/mol$$

Concepts:

1. **Some Basic Concepts of Chemistry:**

Chemistry is a vast subject and for understanding its significance we can take help of following points:

- Chemistry plays an important role in understanding various subjects like physics, geology and biology.
- 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.
- Chemistry plays an important role in various fields like healthcare, industrial, research, food, and farm activities.

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:

1. Solids - have definite volume and definite shape
2. Liquids - have definite volume but not definite shape.
3. Gases - have neither definite volume nor definite shape.

(B) Chemical Classification:

Based upon the composition, matter can be divided into two main types:

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
2. Mixtures are the combination of two or more elements or compounds which are not chemically combined together and may also be present in any proportion.

---

2. Answer: a

Explanation:

3NaOH + FeCl $\rightarrow$ Fe (CH) + NaCl
100 ml 2.14 gm
m = ?
Moles of Fe(CH) $= \frac{2.14}{107} = 2 \times 10^{-2}$ mol
moles FeCl $= 2 \times 10^{-2}$ mol
$M = \frac{2 \times 10^{-2}}{100} \times 1000 = 0.2$ M

Concepts:

1. Some Basic Concepts of Chemistry:

Chemistry is a vast subject and for understanding its significance we can take help of following points:

- Chemistry plays an important role in understanding various subjects like physics, geology and biology.
- 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.
- Chemistry plays an important role in various fields like healthcare, industrial, research, food, and farm activities.

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:

1. Solids - have definite volume and definite shape
2. Liquids - have definite volume but not definite shape.
3. Gases - have neither definite volume nor definite shape.

(B) Chemical Classification:

Based upon the composition, matter can be divided into two main types:

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
2. Mixtures are the combination of two or more elements or compounds which are not chemically combined together and may also be present in any proportion.

---

3. **Answer: c**

Explanation:

$2H_3AsO_4 + 5H_2S -> [Conc\,HCl]As_5 + 8H_2O$

2 moles of Arsenic Acid $->$ 1 mole of Arsenic Pentasulphide

1 moles of Arsenic Acid $->$ 1/2 mole of Arsenic Pentasulphide

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

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

Concepts:

1. Some Basic Concepts of Chemistry:

Chemistry is a vast subject and for understanding its significance we can take help of following points:

- Chemistry plays an important role in understanding various subjects like physics, geology and biology.
- 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.
- Chemistry plays an important role in various fields like healthcare, industrial, research, food, and farm activities.

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:

1. Solids - have definite volume and definite shape
2. Liquids - have definite volume but not definite shape.
3. Gases - have neither definite volume nor definite shape.

(B) Chemical Classification:

Based upon the composition, matter can be divided into two main types:

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

2. Mixtures are the combination of two or more elements or compounds which are not chemically combined together and may also be present in any proportion.

---

4. **Answer: a**

Explanation:

$CH_3COOH(0.06M)$
$50\,ml$
$m.$ moles $= 50 \times 0.06 = 3$
$m.$ moles left $= 50 \times 0.042 = 2.1$
$m.$ moles absorbed $= 0.9$

mass absorbed $= \frac{0.9 \times 10^{-3} \times 60}{3} \times 10^3$
$= \frac{54}{3} = 18\,mg$

Concepts:

1. **Some Basic Concepts of Chemistry:**

Chemistry is a vast subject and for understanding its significance we can take help of following points:

- Chemistry plays an important role in understanding various subjects like physics, geology and biology.
- 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.
- Chemistry plays an important role in various fields like healthcare, industrial, research, food, and farm activities.

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:

1. Solids - have definite volume and definite shape
2. Liquids - have definite volume but not definite shape.
3. Gases - have neither definite volume nor definite shape.

(B) Chemical Classification:

Based upon the composition, matter can be divided into two main types:

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
2. Mixtures are the combination of two or more elements or compounds which are not chemically combined together and may also be present in any proportion.

---

5. Answer: c

Explanation:

$5[M_A + 2M_B] = 125$
$M_A + 2M_B = 25$ ....(1)
$2M_A + 2M_B = 30$ ....(2)
from e (1) & (2)
$M_A = 5$
$M_B = 10$

Concepts:

1. Some Basic Concepts of Chemistry:

Chemistry is a vast subject and for understanding its significance we can take help of following points:

- Chemistry plays an important role in understanding various subjects like physics, geology and biology.
- 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.
- Chemistry plays an important role in various fields like healthcare, industrial, research, food, and farm activities.

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:

1. Solids - have definite volume and definite shape
2. Liquids - have definite volume but not definite shape.
3. Gases - have neither definite volume nor definite shape.

(B) Chemical Classification:

Based upon the composition, matter can be divided into two main types:

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
2. Mixtures are the combination of two or more elements or compounds which are not chemically combined together and may also be present in any proportion.

---

6. **Answer: d**

Explanation:

$H2C2O4 + 2NaOH -> Na2C2O4 + 2H2O$
$m_{eq}\ of\ H_2C_2O_4 = m_{eq}\ NaOH$
$50 \times 0.5 \times 2 = 25 \times M_{NaOH} \times 1$
$\therefore\ M_{NaOH} = 2M$
Now $1000\,ml$ solution = 2×40 gram $NaOH$
$\therefore\ 50$ ml solution = 4 gram $NaOH$

Concepts:

1. Some Basic Concepts of Chemistry:

Chemistry is a vast subject and for understanding its significance we can take help of following points:

- Chemistry plays an important role in understanding various subjects like physics, geology and biology.
- 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.
- Chemistry plays an important role in various fields like healthcare, industrial, research, food, and farm activities.

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:

1. Solids - have definite volume and definite shape
2. Liquids - have definite volume but not definite shape.
3. Gases - have neither definite volume nor definite shape.

(B) Chemical Classification:

Based upon the composition, matter can be divided into two main types:

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
2. Mixtures are the combination of two or more elements or compounds which are not chemically combined together and may also be present in any proportion.

---

7. **Answer: b**

Explanation:

$2NaHCO_3 + H_2C_2O_4 \rightarrow Na_2C_2O_4 + 2CO_2 + 2H_2O$
Here, number of moles of $CO_2 = \frac{0.25\times10^{-3}}{25.9} \approx 10^{-5}$
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 $NaHCO_3 = 10^{-5} \times 84$
$= 84 \times 10^{-5} g$
$\therefore$ % Mass $= \frac{84\times10^{-5}}{10\times10^{-3}} \times 100$
$= 8.4\%$

Concepts:

1. Some Basic Concepts of Chemistry:

Chemistry is a vast subject and for understanding its significance we can take help of following points:

- Chemistry plays an important role in understanding various subjects like physics, geology and biology.
- 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.

- Chemistry plays an important role in various fields like healthcare, industrial, research, food, and farm activities.

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:

1. Solids - have definite volume and definite shape
2. Liquids - have definite volume but not definite shape.
3. Gases - have neither definite volume nor definite shape.

(B) Chemical Classification:

Based upon the composition, matter can be divided into two main types:

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
2. Mixtures are the combination of two or more elements or compounds which are not chemically combined together and may also be present in any proportion.

---

8. **Answer: c**

Explanation:

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

A	+	2B	+	3C	→	AB_2C_3
0.6 gm = 0.1 mol		6×10^{23} atoms = 1 mol		0.036 mol		4.8 gm

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

$(AB_2C_3) = \frac{\text{mass}}{\text{mol. mass}}$
$0.012 = \frac{4.8}{60+M_B\times2+80\times3}$
$\Rightarrow 300 + 2M_B = \frac{4.8}{(0.012)} = 400$
$\Rightarrow 2M_B = 100$
$\Rightarrow M_B = 50\,amu$

Concepts:

1. Some Basic Concepts of Chemistry:

Chemistry is a vast subject and for understanding its significance we can take help of following points:

- Chemistry plays an important role in understanding various subjects like physics, geology and biology.
- 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.
- Chemistry plays an important role in various fields like healthcare, industrial, research, food, and farm activities.

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:

1. Solids - have definite volume and definite shape
2. Liquids - have definite volume but not definite shape.
3. Gases - have neither definite volume nor definite shape.

(B) Chemical Classification:

Based upon the composition, matter can be divided into two main types:

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
2. Mixtures are the combination of two or more elements or compounds which are not chemically combined together and may also be present in any proportion.

---

9. Answer: 1.1 - 1.1

Explanation:

The correct answer is 1.1
Moles of Carbon = $\frac{(0.5\times0.6)}{12}$
Moles of CO_2 = $\frac{(0.5\times0.6)}{12}$
Moles of CO_2 = $\frac{(0.5\times0.6)}{12} \times 44$
Moles of CO_2 = $1.1gm$

Concepts:

1. Some Basic Concepts of Chemistry:

Chemistry is a vast subject and for understanding its significance we can take help of following points:

- Chemistry plays an important role in understanding various subjects like physics, geology and biology.
- 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 inor

ganic chemistry.

- Chemistry plays an important role in various fields like healthcare, industrial, research, food, and farm activities.

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:

1. Solids - have definite volume and definite shape
2. Liquids - have definite volume but not definite shape.
3. Gases - have neither definite volume nor definite shape.

(B) Chemical Classification:

Based upon the composition, matter can be divided into two main types:

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
2. Mixtures are the combination of two or more elements or compounds which are not chemically combined together and may also be present in any proportion.

---

10. **Answer: b**

Explanation:

$$\underset{61gm}{BaCl_2 \cdot xH_2O} \rightarrow \underset{52}{BaCl_2} + \underset{9gm}{xH_2O}$$

$52\,gm\,CaCl_2$ 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, $BaCl_2 \cdot 2H_2O$

Concepts:

1. Some Basic Concepts of Chemistry:

Chemistry is a vast subject and for understanding its significance we can take help of following points:

- Chemistry plays an important role in understanding various subjects like physics, geology and biology.
- 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.
- Chemistry plays an important role in various fields like healthcare, industrial, research, food, and farm activities.

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:

1. Solids - have definite volume and definite shape
2. Liquids - have definite volume but not definite shape.
3. Gases - have neither definite volume nor definite shape.

(B) Chemical Classification:

Based upon the composition, matter can be divided into two main types:

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

2. Mixtures are the combination of two or more elements or compounds which are not chemically combined together and may also be present in any proportion.