YAKEEN NEET 2.0

2026

Some Basic Concept of Chemistry

MPQ Solution - 12 | **Physical Chemistry**

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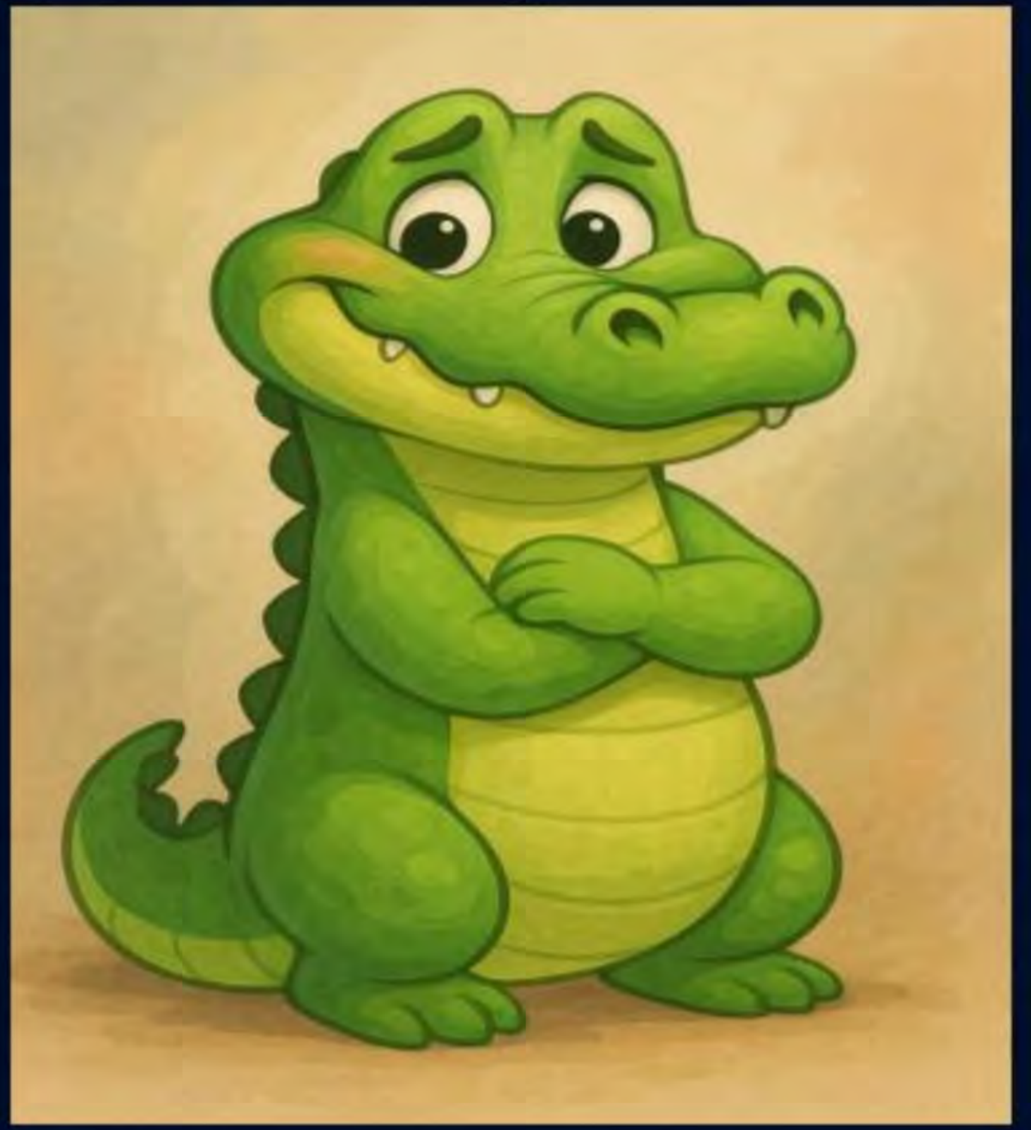
Magarmach Practice Questions (MPQ)



Question (NCERT: PL-23 | JEE Main Jan. 22, 2025 (II))

20 mL of 2 M NaOH solution is added to 400 mL of 0.5 M NaOH solution. The final concentration of the solution is ____ x ____ × 10^{-2} M. (Nearest integer)

$20 \times 2 \times 1 + 400 \times 0.5 \times 1 = 600 \times M \times 1$

$\frac{240}{600} = M$

$M = \frac{4}{10} \times 10^{-1} \times 10 = 40 \times 10^{-2} = x \times 10^{-2}$

$x = 40$

Question (NCERT: PL-18 | NV, JEE Main July 26, 2022 (I))

Chlorophyll extracted from the crushed green leaves was dissolved in water to make 2 L solution of Mg of concentration 48 ppm. The number of atoms of Mg in this solution is $x \times 10^{20}$ atoms. The value of x is ____24____. (Nearest Integer)
(Given : Atomic mass of Mg is 24 g mol^{-1}; $N_A = 6.02 \times 10^{23}$ mol^{-1})

$V(mL) = 2000 ml$ ✓

48 ppm Mg

V of $H_2O = 2000 ml$
d of $H_2O = 1 g/ml$] $\Rightarrow$ mass of soln $= 2000 g$

10^6 g of solution has Mg $= 48$ g

2000 g $= \frac{48}{10^6} \times 2000 = \frac{96}{1000} = 0.096$ g

Atoms of Mg $=$ moles $\times N_A \times 1$

$= \frac{0.096}{24} \times 6.02 \times 10^{23} \times 1$

$= 24.08 \times 10^{20}$

$x = 24.08$

Question (NCERT: PL-23 | Online JEE Main April 09, 2014)

Dissolving 120 g of a compound of mol. wt. 60 in 1000 g of water gave a solution of density 1.12 g/mL. The molarity of the solution is :

$w_B = 120\,g$, $M_B = 60\,g$, $w_A = 1000\,g$

$n_B = \frac{120}{60} = 2$

$w = 1000 + 120 = 1120\,g$

d of soln $= 1.12\,g/ml$

$V(ml) = \frac{w(soln)}{d(soln)} = \frac{1120}{1.12}$

$M = \frac{n_B \times 1000}{V(mL)}$

$= \frac{2 \times 1.12 \times 1000}{1120} = 2\,M$

(A) 1.00 M

(B) 2.00 M

(C) 2.50 M

(D) 4.00 M

Question (NCERT: PL-20 | JEE Main April 02, 2025 (I))

$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$

Consider the above reaction, what mass of $CaCl_2$ will be formed if 250 mL of 0.76 M HCl reacts with 1000 g of $CaCO_3$?

(Given : Molar mass of Ca, C, O, H and Cl are 40, 12, 16, 1 and 35.5 g mol^{-1}, respectively)

$E_{CaCl_2} = \frac{111}{2}$

$E_{CaCO_3} = \frac{100}{2} = 50$

$g\text{-}eq\ CaCO_3 = \frac{1000}{50} = 20$

$g\text{-}eq\ HCl = \frac{250}{1000} \times 0.76 \times 1 = 0.19$

$= 0.19$

$g\text{-}eq\ of\ CaCl_2 = 0.19 = \frac{W_{CaCl_2}}{\frac{111}{2}}$

$W_{CaCl_2} = \frac{0.19 \times 111}{2}$

$= 10.545\ g$

A. 3.908 g

B. 2.636 g

C. 10.545 g

D. 5.272 g

Question (NCERT: PL-23 | JEE Main Jan. 28, 2025 (II))

Concentrated nitric acid is labelled as 75% by mass. The volume in mL of the solution which contains 30 g of nitric acid is _____.
Given : Density of nitric acid solution is 1.25 g/mL

$75\,g\ HNO_3 = 100\,g$

$30\,g = \frac{100}{75} \times 30 = 40\,g$

$V(mL) = \frac{4000}{125} = 32$

(A) 45

(B) 55

(C) 32

(D) 40

Question (NCERT: PL-20 | NV, JEE Main Jan. 28, 2025 (I))

The moalrity of a 70% (mass/mass) aqueous solution of a monobasic acid (X) is __125__ × 10^{-1} M (Nearest integer)

[Given : Density of aqueous solution of (X) is 1.25 g mL^{-1} Molar mass of the acid is 70 g mol^{-1}]

$$M = \frac{70 \times 1.25 \times 10}{70} = 12.5\ M = 125 \times 10^{-1}$$

Question (NCERT: PL-23 | JEE Main Jan. 22, 2025 (I))

Density of 3 M NaCl solution is 1.25 g/mL. The molality of the solution is :

$M_B = 58.5$

$$M = \frac{md}{1 + \frac{m M_B}{1000}}$$

$$3 = \frac{1.25m \times 1000}{1000 + 58.5m}$$

$$3000 + 175.5m = 1250m$$

$$1250m - 175.5m = 3000$$

$$m = \frac{3000}{1074.5}$$

$$m = 2.79\ m$$

(A) 1.79 m

(B) 2 m

(C) 3 m

(D) 2.79 m

QUESTION [JEE MAINS 9 Apr. 2019 (Shift-II)]

What would be the molality of 20% (mass/mass) aqueous solution of KI? (molar mass of KI = 166 g mol^{-1})

39+127

20g KI present in 100g of soln.

$m = \frac{n_B}{w_A(Kg)}$

$n_B = \frac{20}{166}$

$w_A = 100 - 20 = 80\,g$

1. 1.51
2. 1.08
3. 1.48
4. 1.35

$m = \frac{20 \times 1000}{166 \times 80} \times \frac{250}{4}$

QUESTION – (AIIMS 2019)

The empirical formula of the compound if M = 68% (atomic mass = 34) and remaining 32% oxygen is?

(A) MO

$M \frac{68}{34}^{2} O \frac{32}{16}^{2}$

(B) M_2O

$M_2 O$

$\frac{2}{2} \quad \frac{2}{2}$

(C) MO_2

MO

(D) M_2O_3

QUESTION – (AIIMS 2019)

Which one of the following is the lightest?

(A) 0.2 mole of hydrogen gas

(B) 6.023×10^{22} molecules of nitrogen

(C) 0.1 g of silver

(D) 0.1 mole of oxygen gas

mass

$0.2 \times 2\,g = 0.4\,g$

$\frac{6.023 \times 10^{22}}{6.023 \times 10^{23}} \times 28\,g = 2.8\,g$

$0.1 \times 32 = 3.2\,g$

QUESTION – (AIIMS 2017)

Assertion: Equal moles of different substances contain same number of constituent particles.

Reason: Equal weights of different substance contain the same number of constituent particles

(A) If both Assertion and Reason are correct and the Reason is the correct explanation of Assertion.

(B) If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.

(C) If Assertion is correct but Reason is incorrect.

(D) If both the Assertion and Reason are incorrect.

QUESTION – (AIIMS 2018, 2013, 2011)

$N = 0.3 \times 2 = 0.6\ N$

Assertion: The normality of 0.3 M aqueous solution of H_3PO_3 is equal to 0.6 N.

Reason: Equivalent weight of $H_3PO_3 = \frac{\text{Molecular weight of } H_3PO_3}{3}$

(A) If both Assertion and Reason are correct and the Reason is the correct explanation of Assertion.

(B) If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.

(C) If Assertion is correct but Reason is incorrect.

(D) If both the Assertion and Reason are incorrect.

QUESTION – (AIIMS 2018 (E), 26 May)

A binary mixture of bivalent metals having mass 2 g, molecular mass of A and B are 15 and 30 respectively, is dissolved in HCl, it evolves 2.24 L H_2 at STP, what is the mass of A present in mixture?

(A) 1 g

(B) 1.5 g

(C) 0.5 g

(D) 0.75 g

$m_A + m_B = 2g$

$x + m_B = 2g \Rightarrow m_B = (2-x)\,g$

$M_A = 15\,g$

$M_B = 30\,g$

$V_{H_2} = 2.24\,L$

$A + 2HCl \rightarrow ACl_2 + 1H_2(g)$

$\left(\frac{x}{15}\right) \qquad \frac{x}{15} \times 22.4\,L$

$B + 2HCl \rightarrow BCl_2 + 1H_2(g)$

$\left(\frac{2-x}{15}\right) \qquad \frac{(2-x)}{15} \times 22.4\,L$

$$\frac{22.4x}{15} + \frac{22.4(2-x)}{30} = 2.24\,L$$

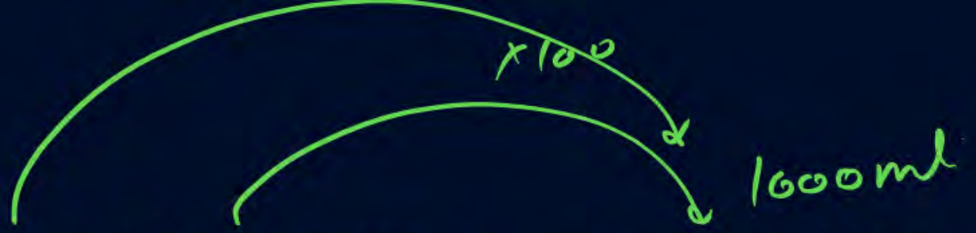
$$\frac{44.8x + 44.8 - 22.4x}{30} = 2.24\,L$$

$$22.4x = 67.2 - 44.8$$

$$22.4x = 22.4\,L$$

$$x = 1$$

QUESTION – (AIIMS 2017)



Volume of water needed to mix with 10 mL $\frac{10\ \text{N}}{160}$ HNO_3 to get 0.1 N HNO_3 is:

(A) 1000 mL

(B) 990 mL

(C) 1010 mL

(D) 10 mL

$N_1V_1 = N_2V_2$

$10 \times 10 = 0.1 \times V_2$

$V_2 = 1000\text{ml}$

V of water added $= 1000 - 10 = 990\text{ml}$

QUESTION – (AIIMS 2016)

$^{20}_{8}O$

Arrange the following in the order of increasing mass (atomic mass : O = 16, Cu = 63, N = 14)

I. one atom of oxygen $\frac{1}{2} \times 32 = 16u = 16 \times 1.67 \times 10^{-24} g$

II. one atom of nitrogen $\frac{1}{2} \times 28 = 14u = 14 \times 1.67 \times 10^{-24} g$

III. 1×10^{-10} mole of oxygen $10^{-10} \times 32 g$

IV. 1×10^{-10} mole of copper $10^{-10} \times 63 = 63 \times 10^{-10} g$

(A) II < I < III < IV

(B) I < II < III < IV

II < I < III < IV

(C) III < II < IV < I

(D) IV < II < III < I

QUESTION – (AIIMS 2014)

Which has the maximum number of molecules among the following

(A) 44 g CO_2 $\frac{44}{44} \times N_A$

(B) 48 g O_3 $\frac{48}{48} \times N_A$

(C) 8 g H_2 $4\frac{8}{8} \times N_A$

(D) 64 g SO_2 $\frac{64}{64} \times N_A$

QUESTION – (AIIMS 2013)

$H_2C_2O_4$

$KMnO_4$ reacts with oxalic acid according to the equation:

$$2\overset{+7}{MnO_4^-} + 5C_2O_4^{2-} + 16H^+ \longrightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$$

Here 20 mL of 0.1 M $KMnO_4$ is equivalent to:

$n_f = |7 - 2| = 5$

milli eq of $KMnO_4 = 20 \times 0.1 \times 5 = 10$

(A) ✗ 20 mL of 0.5 M $H_2C_2O_4$

$20 \times 0.5 \times 2$

(B) ✗ 50 mL of 0.5 M $H_2C_2O_4$

$50 \times 0.5 \times 2$

(C) ✓ 50 mL of 0.1 M $H_2C_2O_4$

$50 \times 0.1 \times 2$

(D) ✗ 20 mL of 0.1 M $H_2C_2O_4$

$20 \times 0.1 \times 2$

QUESTION – (AIIMS 2013)

$H_2C_2O_4 \cdot 2H_2O$

An aqueous solution of 6.3 g of oxalic acid dihydrate is made up to 250 mL. The volume of 0.1 N NaOH required to completely neutralize 10 mL of this solution is:

(A) 20 mL

(B) 40 mL

(C) 10 mL

(D) 4 mL

milli eq oxalic acid = milli eq of NaOH

$$\frac{6.3 \times 1000}{63 \times 250} \times 10 = V(ml) \times 0.1$$

$$V(ml) = \frac{4}{0.1} = 40\ ml$$

$$E_{H_2C_2O_4} = \frac{126}{2} = 63$$

QUESTION – (AIIMS 2012)

In a hydrogen, mass ratio of hydrogen and carbon is 1 : 3, the empirical formula of hydrocarbon is:

H : C
1 : 3

(A) CH_4

(B) CH_2

$H_{\frac{1}{1}}\ C_{\frac{3}{12}}$

(C) C_2H

$H_{\frac{1}{1}}\ C_{\frac{0.25}{0.25}}$ $\quad \frac{1}{0.25}$

CH_4

(D) CH_3

QUESTION – (AIIMS 2012)

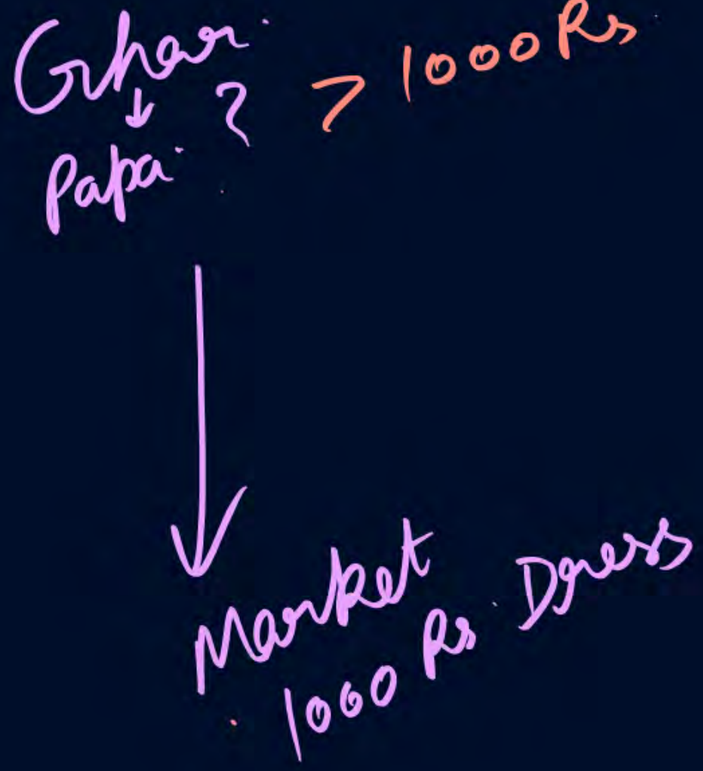
For preparing 0.1 N solution of a compound from its impure sample of which the percentage purity is known, the weight of the substance required will be

(A) less than the theoretical weight

(B) more than the theoretical weight

(C) same as the theoretical weight

(D) none of these



QUESTION – (AIIMS 2010)

$\frac{48}{80} = \frac{6}{10}$

A solution is prepared by dissolving 24.5 g of sodium hydroxide in distilled water to give 1 L solution. The molarity of NaOH in the solution is:

$M = \frac{n_B}{V(L)} = \frac{24.5}{400 \times 1} = \frac{49}{80}$

(A) 0.2450 M

(B) 0.6125 M

(C) 0.9800 M

(D) 1.6326 M

(Give that molar mass of NaOH = 40.0 g mol^{-1})

QUESTION – (AIIMS 2010)

The reaction of calcium with water is represented by the equation:

$$Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$$

What volume of H_2 at STP would be liberated when 8 g of calcium completely reacts with water?

$$\frac{1}{1} = \frac{n_{H_2}}{0.2} \qquad n_{Ca} = \frac{8}{40} = \frac{1}{5}$$

$$n_{H_2} = 0.2$$

$$V_{H_2} \text{ at STP} = 0.2 \times 22.4$$

$$= 4.48\ L$$

$$= 4480\ ml$$

(A) $0.2\ cm^3$

(B) $0.4\ cm^3$

(C) $2240\ cm^3$

(D) $4480\ cm^3$

QUESTION – (AIIMS 2008)

1 mole $C_6H_{12}O_6$ in 1 Kg of water
180 g

Assertion: One molal aqueous solution of glucose contains 180 g of glucose in 1 kg water.

Reason: Solution containing one mole of solute in 1000 g of solvent is called one molal solution.

(A) If both Assertion and Reason are correct and the Reason is the correct explanation of Assertion.

(B) If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.

(C) If Assertion is correct but Reason is incorrect.

(D) If both the Assertion and Reason are incorrect.

QUESTION – (AIIMS 2008)

Assertion: Equivalent weight of a base = $\frac{\text{Molecular weight}}{\text{Acidity}}$

Reason: Acidity is the number of replaceable hydrogen atoms in one molecule of the base.

(A) If both Assertion and Reason are correct and the Reason is the correct explanation of Assertion.

(B) If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.

(C) If Assertion is correct but Reason is incorrect.

(D) If both the Assertion and Reason are incorrect.

QUESTION – (AIIMS 2008)

During electrolysis of water the volume of O_2 liberated is 2.24 dm^3. The volume of hydrogen liberated, under same conditions will be

(A) 2.24 dm^3

(B) 1.12 dm^3

(C) 4.48 dm^3

(D) 0.56 dm^3

$2H_2O(l) \longrightarrow 2H_2(g) + 1O_2(g)$

2 L | 1 L

$2 \times 2.24 = 4.48$ L | 2.24 L

QUESTION – (AIIMS 2002)

Assertion: Atoms can neither be created nor destroyed.

Reason: Under similar condition of temperature and pressure, equal volume of gases does not contain equal number of atoms.

(A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

(B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

(C) If the Assertion is correct but Reason is incorrect

(D) If both the Assertion and Reason are incorrect.

(E) If the Assertion is incorrect but the Reason is correct.

QUESTION – (AIIMS 2002)

$60 \times 12 + 122 \times 1 = 842$

The weight of one molecule of a compound of molecular formula $C_{60}H_{122}$ is:

$\frac{842}{6.022 \times 10^{23}}$ g

(A) 1.2×10^{-20} g

(B) 5.025×10^{23} g

(C) 1.4×10^{-21} g

(D) 6.023×10^{-20} g

THANK YOU