Concentration

1. 250 g solution of D-glucose in water contains 10.8% of carbon by weight. The molality of the solution is nearest to (Given: Atomic Weights are H, 1u; C, 12u; 0, 16u) **[JEE Main, July 2022]**

(1) 1 .03 (2) 2.06 (3) 3.09 (4) 5.40

2. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R) **[JEE Main, June 2022]**

Assertion (A) : At 10°C, the density of a 5M solution of KCl [atomic masses of K and Cl are 39 & 35.5 g mol^{-1}]. The solution is cooled to –21°C. The molality of the solution will remain unchanged.

Reason (R) : The molality of a solution does not change with temperature as mass remains unaffected with temperature.

In the light of the above statements, choose the correct answer from the options given below:

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

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

(1) 1.48 (2) 1.35 (3) 1.08 (4) 1.51

[Jee Main, April 2019]

4. In Carius method of estimation of halogen. 0.45 g of an organic compound gave 0.36 g of AgBr. Find out the percentage of bromine in the compound. **[JEE Main, July 2022]**

(Molar masses : AgBr = 188 g mol^{-1}: Br = 80 g mol^{-1})

(1) 34.04% (2) 40.04% (3) 36.03% (4) 38.04%

5. Which of the following is 'a' FALSE statement? **[JEE Main, Feb 2021]**

(1) Carius tube is used in the estimation of sulphur in an organic compound

(2) Carius method is used for the estimation of nitrogen in an organic compound

(3) Phosphoric acid produced on oxidation of phosphorus present in an organic compound is precipitated as $Mg_2P_2O_7$ by adding magnesia mixture.

(4) Kjeldahl's method is used for the estimation of nitrogen in an organic compound

6. The molarity of the solution prepared by dissolving 6.3 g of oxalic acid ($H_2C_2O_4.2H_2O$) in 250 mL of water in mol L^{-1} is $x \times 10^{-2}$. The value of x is _____. (Nearest integer)
[Atomic mass : H : 1.0, C : 12.0, O : 16.0] **[JEE Main, August 2021]**

7. Ferrous sulphate heptahydrate is used to fortify foods with iron. The amount (in grams) of the sulphate required to achieve 10 ppm of iron in 100 kg of wheat is _____.
Atomic weight : Fe = 55.85; S = 32.00; O = 16.00 **[Jee Main, 2020]**

8. When 800 mL of 0.5 M nitric acid is heated in a beaker, its volume is reduced to half and 11.5 g of nitric acid is evaporated. The molarity of the remaining nitric acid solution is $x \times 10^{-2}$ M. (Nearest Integer) (Molar mass of nitric acid is 63 g mol^{-1}) **[JEE Main, July 2022]**

9. An aqueous KCl solution of density 1.20 g mL^{-1} has a molality of 3.30 mol kg^{-1}. The molarity of the solution in mol L^{-1} is _____ (Nearest integer)
[Molar mass of KCl = 74.5] **[JEE Main, August 2021]**

10. 250 mL of 0.5 M NaOH was added to 500 mL of 1 M HCl. The number of unreacted HCl molecules in the solution after complete reaction is _____ $\times 10^{21}$. (Nearest integer)
($N_A = 6.022 \times 10^{23}$) **[JEE Main, July 2021]**

11. The volume strength of 8.9 M H_2O_2 solution calculated at 273 K and 1 atm is _____.
(R=0.0821 L atm K^{-1} mol^{-1}) (rounded off the nearest integer) **[Jee Main, 2020]**

12. A sample of 0.125 g of an organic compound when analysed by Duma's method yields 22.78 mL of nitrogen gas collected over KOH solution at 280K and 759 mm Hg. The percentage of nitrogen in the given organic compound is ___. (Nearest integer). **[JEE Main, July 2022]**
(a) The vapour pressure of water at 280 K is 14.2 mm Hg
(b) R = 0.082 L atm K^{-1} mol^{-1}

13. While estimating the nitrogen present in an organic compound by Kjeldahl's method, the ammonia evolved from 0.25 g of the compound neutralized 2.5 mL of 2 M H_2SO_4. The percentage of nitrogen present in organic compound is _____. **[JEE Main, July 2022]**

ANSWERS KEY

1.	(2)	**2.**	(1)	**3.**	(4)	**4.**	(1)	**5.**	(2)	**6.**	(20)
7.	(4.95 to 4.97)			**8.**	(54)	**9.**	(3)	**10.**	(226)	**11.**	(100)
12.	(22)	**13.**	(56)								