

2018

Topic - Molarity, Normality

Molarity - The number of moles of solute present in 1 litre of solution is known as Molarity. Represented by M

$$M = \frac{\text{Number of moles of solute}}{\text{Volume of Solution in litre}} = \frac{\text{wt of solute in gm}}{\text{Atomic wt} \times \text{Volume (l)}}$$

In short $M = \frac{W(\text{In gm})}{\underset{\substack{\downarrow \\ \text{at wt}}}{W} \times V(\text{l})}$

Equivalence wt - $\text{Eq wt for any element or Compound} = \frac{\text{Atomic wt}}{\text{Valency}}$

$$\text{Eq wt for Acid} = \frac{\text{Atomic wt}}{\text{No. of } H^+ \text{ ion}}$$

$$\text{Eq wt for Base} = \frac{\text{Atomic wt}}{\text{No. of } OH^- \text{ ion}}$$

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2017

Normality - The number of gram Equivalence of solute present in 1 litre of solution is known as Normality. Represented by N.

$$N = \frac{\text{No. of gram Equivalence of solute}}{\text{Volume of Solution in litre}}$$

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$$N = \frac{\text{wt of solute in gm}}{\text{Eq wt} \times \text{Volume of Solution (l)}}$$

Note (Imp) ① Relation b/w M and N

$$\frac{N}{M} = \text{Valency}$$

② If solⁿ of Volume V_1 , Normality N_1 is neutralized by V_2, N_2 then

$$N_1 V_1 = N_2 V_2$$

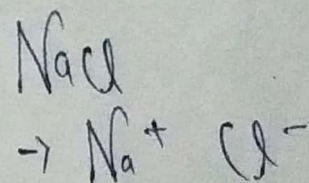
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Example

2017 ① If 5.85 gm NaCl dissolved in water and make solⁿ 500ml find its Molarity, Normality.

Solⁿ - At wt of NaCl = 23 + 35.5
= 58.5

$$\text{Eq wt} = \frac{\text{At wt}}{\text{Valency}} = \frac{58.5}{1}$$



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$$\text{Volume } V = 500 \text{ ml} = \frac{500}{1000} = \frac{1}{2} \text{ l}$$

$$\text{Molarity } M = \frac{\text{wt of Solute in gm}}{\text{At wt} \times \text{Volume of solⁿ (l)}}$$

$$= \frac{5.85}{10 \times 58.5 \times \frac{1}{2}} = \frac{2}{10} = 0.2 \text{ Ans}$$



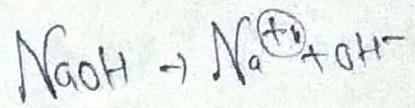
$$\text{Normality } N = \frac{\text{wt}}{\text{Eq wt} \times \text{Volume}} = \frac{5.85}{58.5 \times \frac{1}{2}} = 0.2$$

$$N = 0.2 \text{ Ans}$$

Ques 2 - find the Equivalence wt for following -

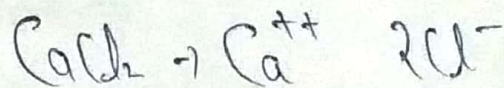
(i) NaOH (ii) CaCl₂ (iii) Na₂CO₃ (iv) H₂SO₄

Soln - (i) At wt of NaOH = 23 + 16 + 1
= 40



$$\text{Eq wt} = \frac{\text{At wt}}{\text{Valency}} = \frac{40}{1} = 40$$

(ii) CaCl₂



$$\text{At wt} = 40 + 35.5 \times 2 = 111$$

$$\text{Eq wt} = \frac{111}{2} = 55.5$$

(iii) Na₂CO₃ $\rightarrow 2\text{Na}^{+} + \text{CO}_3^{--}$

$$\text{At wt} = 23 \times 2 + 12 + 16 \times 3 = 106$$

$$\text{Eq wt} = \frac{106}{2} = 53$$

(iv) H₂SO₄ $\rightarrow 2\text{H}^{+} + \text{SO}_4^{--}$

$$\text{At wt} = 2 \times 1 + 32 + 16 \times 4 = 98$$

$$\text{Eq wt} = \frac{98}{2} = 49$$



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2019

Ques 3 - If the Eq wt of a substance is 40 and Valency is 2 find its Atomic wt.

Soln -
$$\frac{\text{Atomic wt}}{\text{Valency}} = \text{Eq wt}$$

$$\frac{\text{At wt}}{2} = 40$$

$$\boxed{\text{At wt} = 80} \quad \underline{\text{Ans}}$$

2017, 2019
Ques 4 - Calculate the amount of 400 ml of $\frac{N}{10}$ Na_2CO_3 solⁿ

Solⁿ At wt of $\text{Na}_2\text{CO}_3 = 23 \times 2 + 12 + 16 \times 3 = 106$

$$\text{Eq wt} = \frac{106}{2} = 53$$

$$N = \frac{1}{10} = 0.1, \quad V = 400 \text{ ml} \\ = \frac{400}{1000} = 0.4 \text{ l}$$

$$N = \frac{\text{wt}}{\text{Eq wt} \times \text{Volume (l)}}$$

$$0.1 = \frac{\text{wt}}{53 \times 0.4}$$

So wt = 2.12 gm Ans

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2020

Ques 5 - 15 ml 0.1N NaOH solⁿ is Neutralized by 10 ml of HCl solⁿ. find out Normality of solⁿ (HCl)

Solⁿ - $N_1 = 0.1, V_1 = 15 \text{ ml}, N_2 = ?, V_2 = 10$

$$N_1 V_1 = N_2 V_2$$

$$\frac{0.1}{10} \times 15 = N_2 \times 10$$

$$\text{So } N_2 = \frac{15}{100}$$

$$= 0.15N \quad \underline{\text{Ans}}$$



Ques 6 - 4 gm NaOH is dissolved in water and solⁿ become 250 ml find Molarity, Normality (Ans - 0.4, 0.4)

Ques 7 - If 20.6 g of NaBr is dissolved in 500 ml water
Calculate Molarity (Ans - ~~0.53~~ 0.4)
2016

Ques 8 - How much Amount of Sodium Carbonate (Na_2CO_3)
is required to prepare 500 ml solution of 0.01M
 Na_2CO_3 soln (Ans - 0.53 gm)

Ques 9 - $\frac{1}{10}$ of Equivalent wt of HCl is present in 500 ml
Solution. Calculate Normality (Ans - 0.2)
2014, 15

Ques 10 - Calculate the molarity of water. Density of
water is 1 gm/ml. (Ans - 55.6)

Ques 11 - Determine the amount of NaOH needed to
prepare 250 ml of 0.1N soln (Ans - 1 gm)

Ques 12 - If 11.70 gm NaCl is dissolved in 100 ml
find Molarity (Ans - 2M)

Ques 13 - 20 ml of 0.2 NaOH soln is neutralized by 10 ml
of HCl soln. find out normality of HCl soln
2018 (Ans - 0.4)

Ques 14 - Calculate the normality of a soln containing 6.3 gm
of Oxalic acid crystal (mol mass 126) dissolved in
500 ml soln. (Ans 0.2N)

Ques 15 - Find out Equivalence wt of
(a) HCl (b) MgSO_4

Ans - (a) 36.5
(b) 59



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