

PACE-IIT & MEDICAL

MUMBAI / AKOLA / DELHI / KOLKATA / GHAZIABAD / NASHIK / GOA / BOKARO / PUNE

IIT – JEE: 2022

TW TEST (ZENITH ADV)

DATE: 22/08/20

TOPIC: VECTORS

Answer Key

1. (A)
2. (B)
3. (A)
4. (C)
5. (C)
6. (A)
7. (A)
8. (A)
9. (D)
10. (B)
11. (A)
12. (C)
13. (C)
14. (B)
15. (C)
16. (B)
17. (B)
18. (D)
19. (C)
20. (C)

SOLUTION

21. (B)

$$\text{No. of moles of atom} = \frac{3}{1}$$

$$\text{No. of atoms} = 3N_A$$

$$\text{No. of deuterium atom} = \frac{1}{6001} \times 3N_A$$

$$\begin{aligned}\text{No. of neutron} &= \frac{1}{6001} \times 3 \times 6.02 \times 10^{23} \\ &= 3.01 \times 10^{20}\end{aligned}$$

22. (B)

$$\text{No. of moles of } C_2O_4^{2-} = \frac{4.4}{88} = 0.05$$

$$\text{No. of ions} = 0.05 N_A$$

$$\text{No. of electrons in 1 ion} = 12 + 32 + 2 = 46$$

$$\text{No. of electrons in } 0.05 N_A \text{ ions} = 46 \times 0.05 N_A = 2.3 N_A$$

23. (D)

$$\text{No. of moles of } O_2 \text{ in 1 gm dioxygen} = \frac{1}{32}$$

$$\text{No. of molecules of } O_2 = \frac{1}{32} N_A$$

$$\text{No. of atoms of O} = \frac{2N_A}{32} = \frac{N_A}{16}$$

1 gm atomic oxygen

$$= \frac{1}{16} \text{ moles of O atoms}$$

$$= \frac{N_A}{16} \text{ atoms of O}$$

1 gm of Ozone

$$= \frac{1}{48} \text{ moles of } O_3$$

$$= \frac{1}{48} N_A \text{ molecules of } O_3$$

$$= \frac{3}{48} N_A \text{ atoms of O} = \frac{N_A}{16}$$

24. (A)

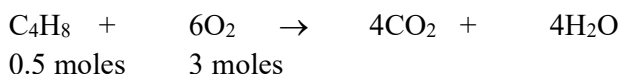
$$\begin{aligned} \text{Volume of sea water} &= 1.4 \times 10^{21} \text{ L} \\ &= 1.4 \times 10^{24} \text{ ml} \end{aligned}$$

$$\begin{aligned} \text{Wt. of sea water} &= 1.4 \times 10^{24} \text{ gm} \\ &= 1.4 \times 10^{21} \text{ kg} \end{aligned}$$

$$\text{Wt. of chlorine} = 19 \times 1.4 \times 10^{21} \text{ gm}$$

$$\text{No. of moles of chlorine atoms} = \frac{19 \times 1.4 \times 10^{21}}{35.5} = 7.5 \times 10^{20}$$

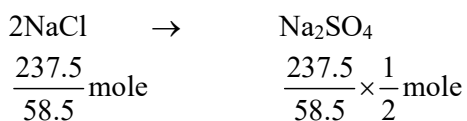
25. (A)



26. (D)

$$\text{Wt. of pure NaCl} = 250 \times \frac{95}{100} \text{ gm} = 237.5 \text{ gm}$$

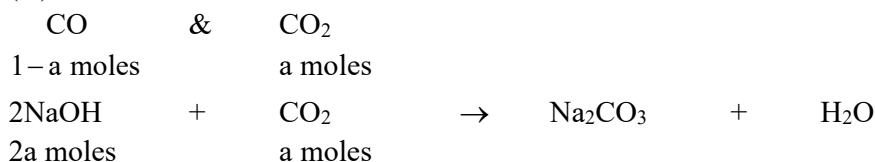
$$\text{No. of moles of NaCl} = \frac{237.5}{58.5}$$



$$\text{Wt. of Na}_2\text{SO}_4 = \frac{237.5}{58.5} \times \frac{1}{2} \times 142 \text{ gm} = 288.24 \text{ gm}$$

$$\text{Wt. of impure sample} = \frac{100}{90} \times 288.24 = 320.3 \text{ gm}$$

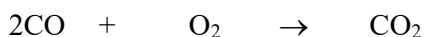
27. (A)

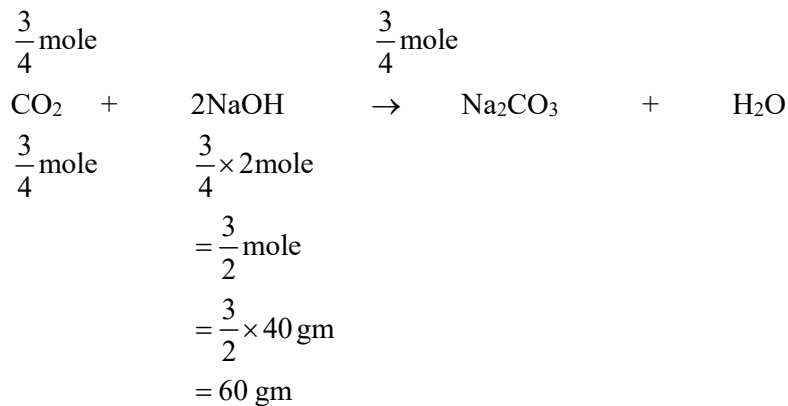


$$2a = \frac{20}{40}$$

$$a = \frac{1}{4} \text{ moles}$$

$$n_{\text{CO}} = 1 - \frac{1}{4} = \frac{3}{4} \text{ moles}$$





28. (A)

$$[\text{Cl}^-] = 0.6 \text{ M} = \frac{(0.8)(V)(3) + (0.2)(50)(2)}{(V + 50)}$$

$$0.6V + 30 = 2.4V + 20$$

$$1.8V = 10$$

$$V = \frac{100}{18} = 5.56 \text{ ml}$$

29. (A)

Wt. of HCl gas = x gm

$$\frac{x}{50 + x} \times 100 = 40$$

$$x = \frac{100}{3} \text{ gm}$$

$$\text{Wt. of solution} = \frac{100}{3} + 50 = \frac{250}{3} \text{ gm}$$

Volume of solution = 75 ml

$$\text{Density} = \frac{250/3}{75} = 1.11 \text{ gm/ml}$$

30. (C)

Assume 100 gm solution

$$\% \frac{w}{w} = 20$$

Wt. of glucose = 20 gm

$$\% \frac{w}{v} = 25$$

$$\frac{20}{v} \times 100 = 25$$

$$v = 80 \text{ ml}$$

$$\text{Density} = \frac{100}{80} = 1.25 \text{ gm/ml}$$

31. (C)

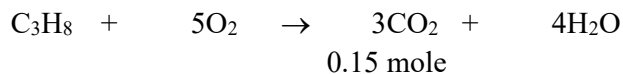
MnO & MnO₂

$$\frac{200}{3} \text{ mole} \quad \frac{100}{3} \text{ mole}$$

$$\text{No. of moles of Mn} = \frac{200}{3} + \frac{100}{3} = 100$$

$$\% \text{Mn} = \frac{100 \times 55}{\left(\frac{200}{3} \times 71\right) + \left(\frac{100}{3} \times 87\right)} \times 100 = 72.05$$

32. (D)



$$n_{\text{H}_2\text{O}} = \frac{4}{3} \times 0.15 = 0.2 \text{ mole}$$

$$\text{No. of molecules of H}_2\text{O formed} = 0.2 \times 6 \times 10^{23}$$

$$\text{No. of drops of water formed} = \frac{0.2 \times 6 \times 10^{23}}{1.7 \times 10^{21}} = 70$$

33. (D)

	C	:	H
Mass Ratio	8	:	1
Moles ratio	$\frac{8}{12}$:	1
	2	:	3

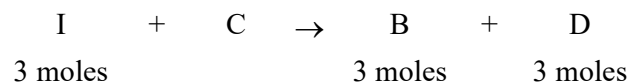
$$\text{EF} = \text{C}_2\text{H}_3\text{O}_x$$

$$10.6 = \frac{16x}{24 + 3 + 16x} \times 100$$

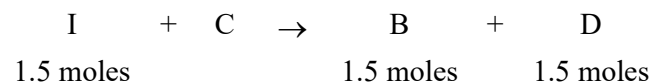
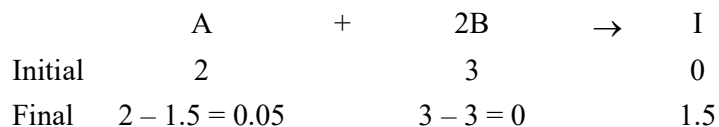
$$x = 0.2$$

$$\text{EF} = \text{C}_2\text{H}_3\text{O}_{0.2} \text{ or } \text{C}_{10}\text{H}_{15}\text{O}$$

34. (C)



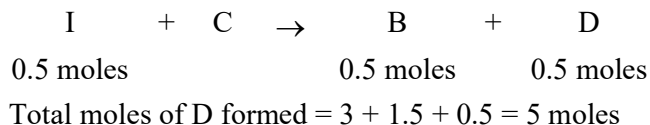
Now 3 moles of B again react with unreacted A.



Now again B reacts with unreacted A.



Initial	0.5	1.5	0
Final	$0.5 - 0.5 = 0$	$1.5 - 1 = 0.5$	0.5



35. (B)

$$\begin{aligned}
 \text{Final volume} &= (V + 10V) \frac{98}{100} = (11V) \frac{98}{100} \\
 \text{Molarity} &= \frac{2.2V}{(11V) \frac{98}{100}} = \frac{220}{11 \times 98} = \frac{20}{98} = 0.204
 \end{aligned}$$

36. (D)

No. of moles of glucose = a
 Wt. of glucose = 180a gm
 Wt. of water = 1000 - 180a gm

$$1 = \frac{a}{1000 - 180a} \times 1000$$

$$1000 - 180a = 1000a \Rightarrow a = \frac{1000}{1180}$$

Final wt. of water = 1000 - 180a + 4000 gm

$$= 5000 - 180 \left(\frac{1000}{1180} \right) \text{ gm}$$

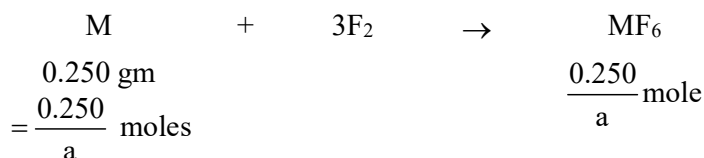
$$= 4847 \text{ gm}$$

$$= 4.847 \text{ kg}$$

$$\text{Final molality} = \frac{1000/1180}{4.847} = 0.175 \text{ m}$$

37. (B)

Atomic mass of M = a



$$\frac{0.250}{a} (a + 114) = 0.547$$

$$0.250a + (114)(0.250) = 0.547a$$

$$a = \frac{28.5}{0.297} = 95.96$$

38. (B)

$$\text{Average molecular mass} = \frac{\text{total mass}}{\text{total moles}}$$

$$= \frac{100}{\frac{90}{2} + \frac{10}{4}} = 2.10$$

39.

(A)



a mole a mole

total no, of moles = 2a

total volume = (22.4)(2a) ℓ

total wt. = (16)(a) + (30)a = 46a

$$\text{density} = \frac{46a}{(22.4)(2a)} = 1.03 \text{ gm}/\ell$$

40.

(C)

$$\text{Initial no. of moles of Ca atoms} = \frac{2 \times 10^{-3}}{40}$$

$$\text{Moles of Ca atoms removed} = \frac{1.2 \times 10^{19}}{6 \times 10^{23}}$$

No. of moles of Ca atom left

$$= \frac{2 \times 10^{-3}}{40} - \frac{1.2 \times 10^{19}}{6 \times 10^{23}}$$

$$= 0.5 \times 10^{-4} - 0.2 \times 10^{-4} = 3 \times 10^{-5}$$