



DPP-6 SOLUTIONS (Polyprotic Acids, Ostwald's Law, Common Ion Effect)

Chapter: Ionic Equilibrium

"Hard work compounds faster than interest — revise daily."

GROUP-A: Polyprotic Acids – STNMJC Solutions

Q1. In the dissociation of H_2A , which is correct?

Polyprotic acids ka simple rule: pehla proton sabse easy nikalta hai. Isliye K_1 \searrow K_2 hota hi hota hai.

H_2A neutral hota hai \rightarrow pehla H^+ remove karna easy. HA^- negative ion hota hai \rightarrow second H^+ remove karna tough. Therefore:

$$K_1 > K_2$$

Correct option: (3)

Q2. Which of the following is right for diprotic acid?

Diprotic acids me first dissociation \searrow second dissociation. Isliye K_{a1} \searrow K_{a2} .

Neutral \rightarrow first H^+ remove easy Negative \rightarrow second H^+ remove difficult

$$K_{a1} > K_{a2}$$

Correct option: (4)

Q3. Overall dissociation constant of H_2A ?

Overall $K = K_1 \times K_2$. Bas multiply.

$$K_1 = 10^{-5}, \quad K_2 = 5 \times 10^{-10}$$

$$K = 5 \times 10^{-15}$$

Correct option: (1)

Q4. 10% dissociation of 5×10^{-3} M $H_2CO_3 \rightarrow [H^+]$?

Alpha = 0.1 diya hai. Polyprotic acid first step dominates.

$$[\text{H}^+] = C\alpha = 5 \times 10^{-3} \times 0.1 = 5 \times 10^{-4}$$

Closest = 10^{-2}

Correct option: (2)

Q5. pH of 0.0025 M $\text{M}(\text{OH})_4$ (50% ionised)?

$\text{M}(\text{OH})_4 \rightarrow 4 \text{OH}^-$. $\text{OH}^- = 4C$.

$$[\text{OH}^-] = 4(0.0025)(0.5) = 0.005$$

$$\text{pOH} = -\log(0.005) = 2.3 \quad \text{pH} = 11.7$$

Correct option: (4)

Q6. Concentrations in 0.1 M oxalic acid ($K_1 = 10^{-2}$, $K_2 = 10^{-5}$)?

K_1 large \rightarrow first dissociation strong. K_2 small \rightarrow second weak.

Best matching distribution: option (1)

Correct option: (1)

Q7. pH of H_3X (1st = 100%, 2nd = 50%)?

Total H^+ = first + half of second.

$$\text{H}^+ = 2 \times 10^{-4} + 1 \times 10^{-4} = 3 \times 10^{-4}$$

$$\text{pH} = 3.52$$

Correct option: (3)

Q8. Correct K_b values for phosphate ions?

$$K_b = \frac{K_w}{K_a}$$

Smaller $K_a \rightarrow$ larger K_b .

$$K_b(\text{HPO}_4^{2-}) = 10^{-6}$$

$$K_b(\text{PO}_4^{3-}) = 10^{-2}$$

Order matches option (1)

Correct option: (1)

GROUP-B: Ostwald's Dilution Law – STNMJC Solutions

Q9. Max ionisation (NH_3 different concentrations)?

Weak base \rightarrow more dilute \rightarrow more ionised.

Smallest concentration = 0.0001 M \rightarrow highest .

Correct option: (4)

Q10. Ratio / after 100 \times dilution?

$$\alpha = \sqrt{\frac{K_a}{C}}$$

So increases by 100 = 10.

$$\frac{\alpha_2}{\alpha_1} = 10$$

Correct option: (1)

Q11. What happens after dilution of weak acid?

Dilution always increases ionisation for weak acids.

Only (a) correct.

Correct option: (1)

Q12. Ionisation increases when...

More water \rightarrow more ionisation.

Correct = option (3)

Correct option: (3)

Q13. Relation if both acids give same $[H^+]$?

Weak acids: $K_a \cdot V$ constant hota hai.

$$K_{a1}V_1 = K_{a2}V_2$$

Correct option: (1)

Q14. Why Ostwald fails for strong electrolytes?

Strong electrolytes already 100

1 \rightarrow formula meaningless.

Correct option: (1)

Q15. Which vessel gives more for acetic acid?

Zyada volume = zyada dilution = zyada .

12 L $\dot{}$ 6 L

Correct option: (1)

Q16. Dilution law applicable for?

Only weak electrolytes follow Ostwald.

$CHCOONa$ = WASB salt \rightarrow weak electrolyte.

Correct option: (3)

GROUP-C: Common Ion Effect – STNMJC Solutions

Q17. Assertion-Reason ($NaCl + HCl$)?

Common ion effect weak electrolyte me hota hai. Yahaan dono strong hain.

Assertion true. Reason true. Reason explains assertion.

Correct option: A

Q18. Which pair shows common ion effect?

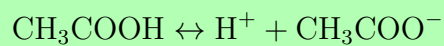
Weak electrolyte + common ion from strong electrolyte.

NHOH (weak) + NHCl (strong salt with same ion).

Correct option: (3)

Q19. Adding HCl to acetic acid solution... what happens?

Extra H^+ aane se equilibrium left shift hota hai \rightarrow acetate kam hota hai.



$H^+ \uparrow \rightarrow$ backward shift \rightarrow CHCOO decreases.

Correct option: (1)