# HYDROGEN AND ITS COMPOUND

**1.** In comparison to the zeolite process for the removal of permanent hardness, the synthetic resins method is :

(1) less efficient as it exchanges only anions

(2) more efficient as it can exchange only cations

(3) less efficient as the resins cannot be regenerated

(4) more efficient as it can exchange both cations as well as anions

**2.** Hydrogen has three isotopes (A), (B) and (C). If the number of neutron(s) in (A), (B) and (C) respectively, are (x), (y) and (z), the sum of (x), (y) an (z) is :

(1) 4 (2) 3 (3) 2 (4) 1

## SOLUTION

**1. NTA Ans. (4)**

**Sol.** (a) Zeolite method removes only cations ($Ca^{2+}$ and $Mg^{2+}$ ion) present in hard water

$2NaZ + M^{2+}(aq) \rightarrow MZ_2(s) + 2Na^+(aq)$

(M→Mg, Ca)

(b) Synthetic resin method removes cations ($Ca^{2+}$ and $Mg^{2+}$ ion) and anions (like $Cl^-$, $HCO_3^-$, $SO_4^{2-}$ etc.)

(i) $2RNa(s) + M^{2+}(aq) \rightarrow R_2M(s) + 2Na^+(aq)$

(Cation exchange resin) (M→Mg, Ca)

(ii) $RNH^+_3\,OH^-(s) + X^-(aq) \rightarrow RNH_3^+\,X^-(s) + OH^-(aq)$

(Anion exchange resin) ($X^-$=$Cl^-$,$HCO_3^-$,$SO_4^{2-}$ etc)

**2. NTA Ans. (2)**

**Sol.** Hydrogen has three isotopes

| Isotopes | Number of neutrons |
|---|---|
| Protium ($_1^1H$) | 0 |
| Deutrium ($_1^2H$) | 1 |
| Tritium ($_1^3H$) | 2 |

Hence the sum of neutrons are 3