Nishant Jindal

Ion - exchange method

$Na_2Si_2Al_2O_8 \cdot x H_2O$

$Na_2O \cdot Al_2O_3 \cdot 2SiO_2 \cdot x H_2O$ (alumino silicate)

NaZ

$$2NaZ + M^{+2} \longrightarrow MZ_2 + 2Na^{+}$$

Nishant Jindal

Hardness
- perm. → Ca^{+2}/Mg^{+2} SO_4^{-2}/Cl^-
- temp. Ca^{+2}/Mg^{+2} HCO_3^-

Synthetic Resin Method

$R\overset{+}{N}H_3\,\bar{O}H + X^-$

↓

$RNH_3X + OH^-$

$H^+ + OH^- \rightarrow H_2O$

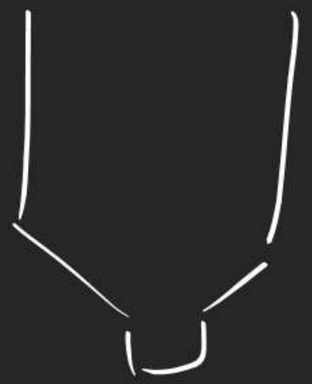
$RSO_3\bar{H} + NaCl$

$RNa + Ca^{+2}/Mg^{+2}$

↓

$R_2Ca/Mg + Na^+$

H^+



Cation exchanger

Anion exchanger