

# ION EXCHANGE PROCESS

(DE-IONIZATION OR DE-MINERALIZATION)

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- ▶ It produces water of very low hardness (~2ppm). So it is very good for treating water for use in high-pressure boilers.
- ▶ The process can be used to soften highly acidic or alkaline water.

# ADVANTAGES

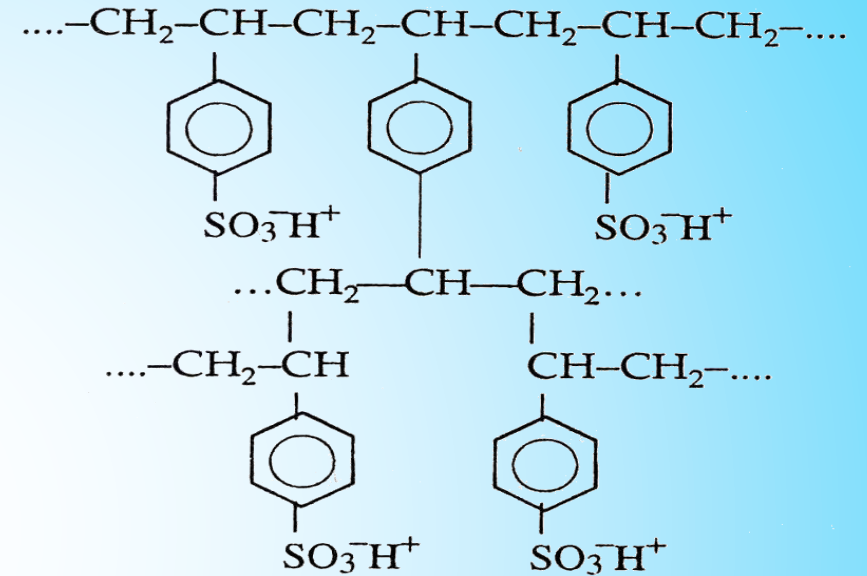


## ION EXCHANGE RESINS

- ▶ Ion-exchange resins are insoluble, cross-linked; long chain organic polymers with a microporous structure and the functional groups attached to the chains are responsible for the ion-exchanging properties.

# ION EXCHANGE RESINS

- ▶ Cation exchange resins are mainly styrene-divinyl benzene copolymers, which on sulphonation or carboxylation, becomes capable of exchange their hydrogen ions with the cations in the water
- ▶ These resins contain acidic functional groups (-COOH, -SO<sub>3</sub>H etc.) which are capable of exchanging their H<sup>+</sup> ions with other cations, which comes in their contact.

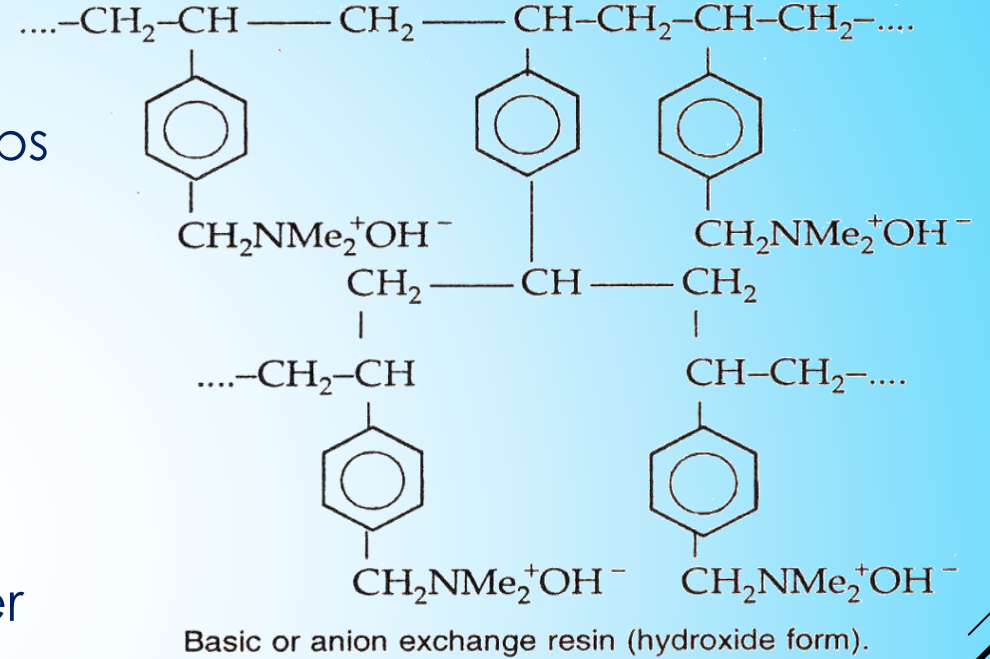


Acidic or cation exchange resin (sulphonate form)

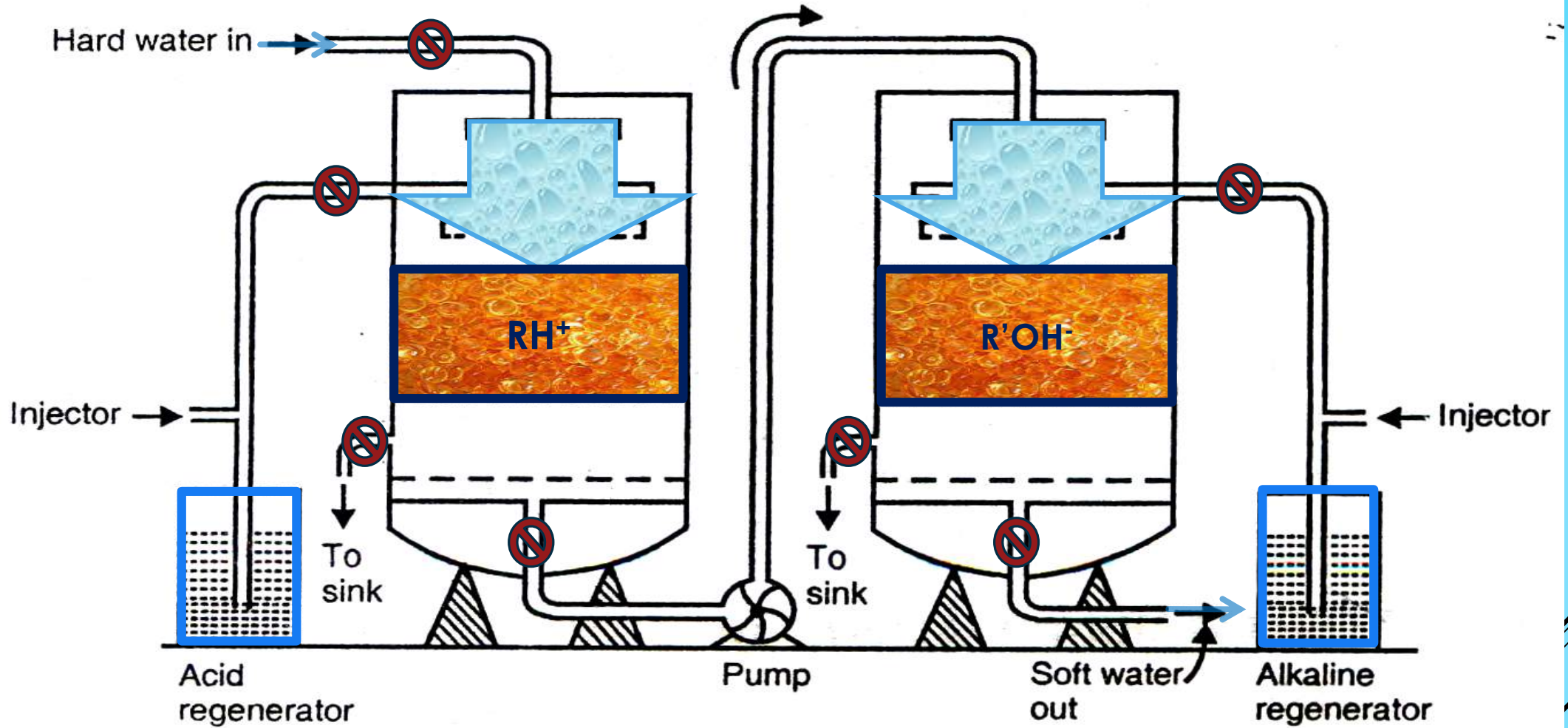
# CATION EXCHANGE RESINS (RH<sup>+</sup>)



- ▶ Anion exchange resins are styrene-divinyl benzene which contain amino or quaternary ammonium or quaternary phosphonium groups as an internal part of the resin matrix.
- ▶ These, after treatment with dil. NaOH solution, become capable to exchange their OH<sup>-</sup> ions with anions in water.
- ▶ These resins contain basic functional groups (-NH<sub>2</sub>=NH<sub>2</sub> as hydrochlorides) which are capable of exchanging their anions with other anions, which comes in their contact.



# ANION EXCHANGE RESINS (R'OH<sup>-</sup>)



Demineralization of water

# ION EXCHANGE PROCESS



# REGENERATION OF EXHAUSTED RESIN

**In next lecture:** Potable water standard as per BIS

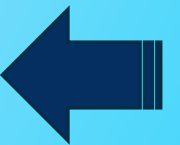
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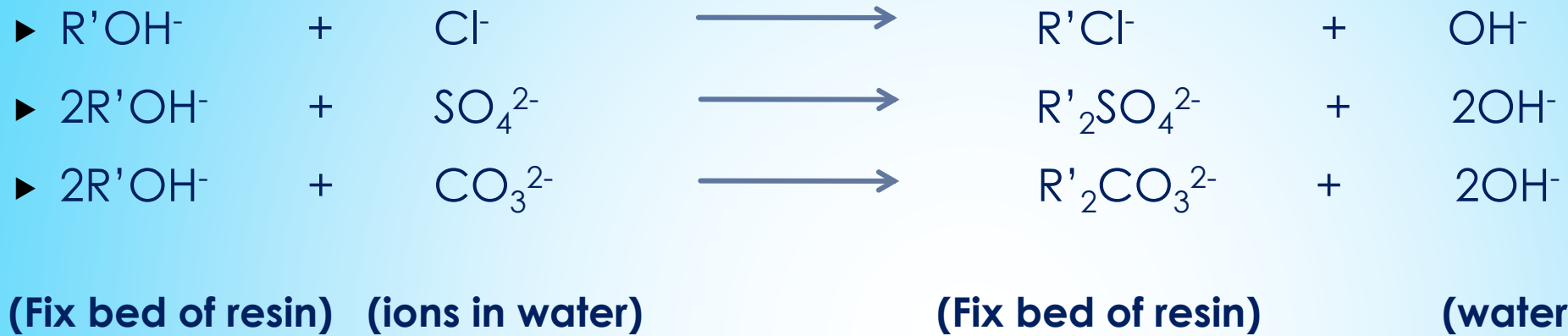
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# REACTIONS WITH CATION EXCHANGER





# REACTIONS WITH ANION EXCHANGER

