

Answer any three from the following.

(3x5=15 Marks)

1. What is the principle of Lime Soda process? Give their functions with chemical reactions.
2. Write notes on Reverse osmosis and Ultra filtration.
3. With a neat diagram explain the ion exchange method for water softening.
4. Calculate the quantity of lime and soda in 20% excess for softening 50,000 litres of hard water containing $\text{Ca}(\text{HCO}_3)_2=8.1\text{mgs/lit}$, $\text{Mg}(\text{HCO}_3)_2=7.3\text{mgs/lit}$, $\text{CaSO}_4=13.6\text{mgs/lit}$, $\text{MgCl}_2=4.75\text{mgs/lit}$, $\text{CaCl}_2=13.875\text{mgs/lit}$, $\text{NaCl}=10\text{mgs/lit}$.
5. A zeolite softener was exhausted after passing 4460 litres of hard water. Calculate the hardness of the water if it required 100litres of salt solution containing 150gm NaCl/litre .