Somaiya Vidyavihar University

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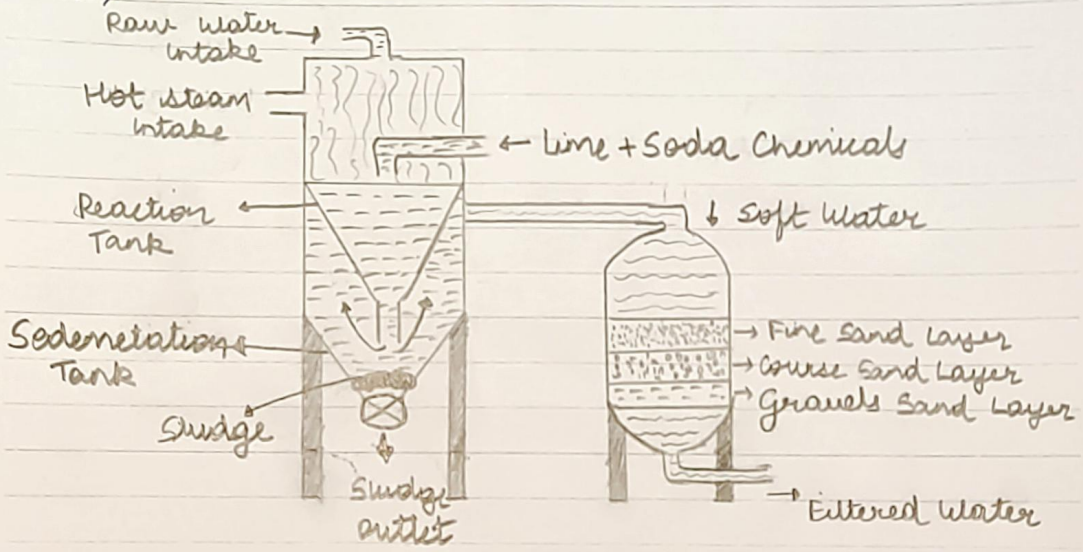
Pargat Singh Dhanjal	Pargat

Q1)

1.1) c) Calcium sterate
1.2) c) $MgCO_3$
1.3) b) 1.43° Fr
1.4) b) NaOH
1.5) d) None
1.6) c) Cannot be recycled
1.7) a) Methyl isocyanate
1.8) d) D-Glucose
1.9) c) of the same
1.10) a) 300 - 800

Q2) 2.1) a) Hot - soda lime



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2.1)

b) By Hot-lime Soda Process the residual hardness of soften water is 15-30 ppm.

c) Advantages:
- Less amount of coagulant is require at high temp.
- Both highly acidic & highly alkaine water can be treated by this process.

Disadvantages:
- Skilled & carefull supervision is required
- Disposal of the sludge formed is a hassel.

2.2)

Impurity	Quantity	Type	M.F	$CaCO_3$ equivalence
$Mg(HCO_3)_2$	6.3 ppm	Temp	100/146	4.3 ppm
$Ca(HCO_3)_2$	7.7 ppm	Temp	100/162	4.7 ppm
$MgCO_3$	3.9 ppm	Temp	100/84	4.6 ppm
$CaCO_3$	8 ppm	Temp	100/100	8 ppm
$MgSO_4$	24 ppm.	Perm	100/120	20 ppm

where, $CaCO_3$ equivalence = Quantity × MF.

Temporary Hardness = due to $Mg(HCO_3)_2 + Ca(HCO_3)_2 + MgCO_3 + CaCO_3$

$= 4.3 + 4.7 + 4.6 + 8$

$= 21.6$ ppm

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Permanent Hardness = due to $MgSO_4$

= 20 ppm

∴ Total Hardness = Temporary Hardness + Permanent Hardness

= 21.6 + 20

Total Hardness = 41.6 ppm

Q3) 3.1) Atom economy is the efficiency in conversion of a chemical reaction in terms of the atoms involved in the generation of the desired product. It is also known as Atom efficiency. It is one of the 12 principles as well as an important concept of green chemistry.

Atom economy can be calculated by the formula, as the ratio of Relative molecular mass of desired product to that of the relative molecular mass of all reactants multiplied by 100.

$$\% \text{ Atom Economy} = \frac{\text{Relative molecular mass of desired product}}{\text{Relative molecular mass of all reactants}} \times 100$$

This concept was developed by B.M Trost. Our main goal in green chemistry is to maximising Atom economy. As it is very common in organic reactions to produced undesired products along with our product

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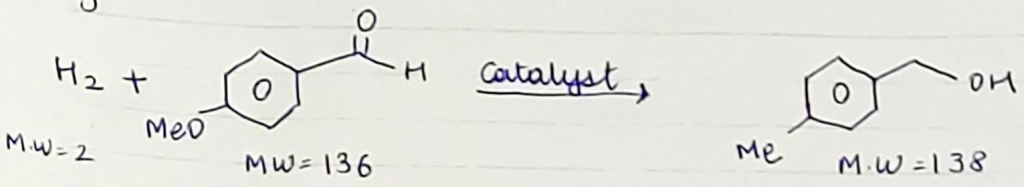
eg:-



So as to calculate Atom economy in the ~~following~~ above example.

$$\% \text{ Atom economy} = \frac{138}{136+2} \times 100 = 100\%$$

Q3)

3.2) Fullerenes are spherical carbon-cage molecules with sixty or more than 60 carbon atoms. It was named after R. Buckminster Fuller. It is a polyhedron with 12 pentagonal faces & any no. of hexagonal faces. Its nickname is Bucky Ball as it measures about 0.7 - 1.5 nm in diameter. They as other nanomaterial - Is show ~~unusual~~ unusual properties as carbon materials. They have good medical uses. They are used as strong antioxidants. They can also be binded to antibodies to treat cancer causing cells. Heat & resistance and super conductivity are other strong points of fullerenes.