Engineering Chemistry

UNIT IA

Que. Suspended impurities can be separated by_____.
A. Zeolite process
B. Ion Exchange process
C. Filtration
D. Osmosis
Ans. C

Que. The impurities in water having particle size greater than_____are suspended particles.
A. 1000 A°
B. 10 A°
C. 0. 1 A°
D. 1 A°
Ans. A

Que. The impurities like bacteria, fungi etc. and other small size aquatic animals are coming in the category of _____ impurities.
A. Suspended
B. Biological
C. Colloidal
D. Dissolved
Ans. B

Que. Water which does not form lather readily with soap is called as_____.
A. Soft water
B. Pure water
C. Impure water
D. Hard water
Ans. D

Que. The water which contains impurities like $Ca(HCO_3)_2$, $Mg(HCO_3)_2$, $MgCO_3$ is the type of_____hardness.
A. Carbonate
B. Non-carbonate
C. Permanent
D. Mild
Ans. A

Que. When water is becoming hard due to the salts other than carbonates then the type of hardness is_____.
A. Carbonate
B. Non-carbonate
C. Sulphate
D. Nitrate
Ans. B

Que. $MgCO_3 + H_2O \xrightarrow{\text{Boiled}} Mg(OH)_2 + CO_2$ The hardness removed by above method is_____hardness.
A. Mild
B. Temporary
C. Non-carbonate
D. Permanent
Ans. B

Que. Rain water is_____water.
A. Hard
B. Soft
C. Impure
D. Double distilled
Ans. B

Que. Commonly used unit of hardness is _____.
A. ml
B. Kg
C. ppm of $CaCO_3$
D. cm
Ans. C

Que. In EDTA vs hard water titration, the indicator used is_____.
A. Phenolpthalein
B. EBT
C. Methyl orange
D. Fluoroscien
Ans. B

Que. The colour of the metal-EDTA complex is_____.
A. Colourless
B. Wine red
C. Blue
D. Yellow
Ans. A

Que. The colour of metal-EBT complex is _____.
A. Colourless
B. Wine red
C. Blue
D. Yellow
Ans. B

Que. Na_2EDTA is_____dentate ligand.
A. Bi
B. Tri
C. Tetra
D. Hexa
Ans. D

Que. In EDTA-hard water titration along with indicator_____is added.
A. HCl
B. Buffer
C. NaOH
D. HNO_3
Ans. B

Que. In EDTA titration by adding buffer solution_____maintained.
A. Alkalinity
B. Acidity
C. pH
D. Neutrality
Ans. C

Que. In alkalinity titration, first end point is called as_____end point.
A. Phenolpthalein
B. EBT
C. Methyl orange
D. Fluorosciene
Ans. A

Que. In alkalinity experiment, phenolphthalein end point is_____.
A. Colourless to pink
B. Pink to colourless
C. Yellow to red
D. None of these
Ans. B

Que. In alkalinity titration, second end point is called as_____end point.
A. Phenolpthalein
B. EBT
C. Methyl orange
D. Fluoroscien
Ans. C

Que. In alkalinity experiment, methyl orange end point is_____.
A. Colourless to pink
B. Pink to colourless
C. Yellow to red
D. None of these
Ans. C

Que. If P = 0, then_____alkalinities are present.
A. OH^-
B. HCO_3^-
C. CO_3^{--}
D. OH^- and CO_3^{--}
Ans. B

Que. If P = ½ M, then _____alkalinities are present.
A. OH^-
B. HCO_3^-
C. CO_3^{--}
D. OH^- and CO_3^{--}
Ans. C

Que. If P = M, then _____alkalinities are present.
A. OH^-
B. HCO_3^-
C. CO_3^{--}
D. OH^- and CO_3^{--}
Ans. A

Que. If P < ½ M, then _____alkalinities are present.
A. OH^-
B. HCO_3^-
C. CO_3^{--}
D. HCO_3^- and CO_3^{--}
Ans. D

Que. If P > ½ M, then _____alkalinities are present.

A. OH^-
B. HCO_3^-
C. CO_3^{--}
D. OH^- and CO_3^{--}
Ans. D

Que. Determination of Alkalinity is _____type of titration.
A. Precipitation
B. Redox
C. Complexometric
D. Acid-base
Ans. D

Que. Hardness determination is _____type of titration.
A. Precipitation
B. Redox
C. Complexometric
D. Acid-base
Ans. C

Que. Alkalinity of water is due to _____.
A. OH^-
B. CO_3^{--}
C. HCO_3^-
D. All of these
Ans. D

Que. Salts responsible for hardness are in _____form.
A. Insoluble
B. Soluble
C. Partly soluble
D. None of these
Ans. B

Que. Carbonate hardness =_____ hardness.
A. Permanent
B. Mild
C. Temporary
D. None of these
Ans. C

Que. Unit for hardness is_____ppm.
A. gm / lit
B. lit/gm
C. mg/lit
D. mg/ml
Ans. C

Que. In EDTA method, buffer solution used to make water alkaline is a mixture of _____+_____.
A. $NH_4Cl + NH_4OH$
B. $NH_4Cl + H_2O$
C. $NH_4OH + KCl$
D. All of these
Ans. A

Que. In EDTA method, pH of the buffer solution is_____.
A. 5
B. 8
C. 10
D. 7
Ans. C

Que. 1 M Na_2EDTA = _____$CaCO_3$.
A. 10 g
B. 100 g
C. 1000 g
D. None of these
Ans. B

Que. Salts responsible for permanent hardness are_____.
A. Calcium sulphate and calcium bicarbonate
B. Sodium sulphate and calcium bicarbonate
((C)) Sodium sulphate and Magnesium chloride
D. Calcium sulphate and Magnesium chloride
Ans. D

Que. Salts responsible for temporary hardness are_____.
A. Calcium carbonate and magnesium bicarbonate
B. Sodium sulphate and calcium bicarbonate
((C)) Sodium sulphate and Magnesium chloride

D. Calcium sulphate and Magnesium chloride
Ans. A

Que. Temporary hardness of water is removed by_____.
A. Filtration of water
B. Sedimentation of water
((C))Boiling of water
D. All of these
Ans. C

Que. Permanent hardness of water is removed by_____.
A. Filtration of water
B. Sedimentation of water
((C))Boiling of water
D. Chemical treatment
Ans. D

Que. On boiling hard water temporary hardness is removed by forming precipitates of_____.
A. Calcium and magnesium chloride
B. calcium and magnesium carbonate
((C))Calcium carbonate and magnesium hydroxide
D. Calcium hydroxide and magnesium carbonate
Ans. C

Que. Molecular weight of calcium carbonate is_____.
A. 100
B. 50
((C))25
D. 200
Ans. A

Que. Degree of hardness is_____.
A. Amount of hardness present in the sample water
B. Amount of hardness
((C))Amount of hardness imparting impurities in sample water
D. Amount of sample water
Ans. C

Que. Hardness of water is its_____.
A. Soap releasing capacity
B. Soap consuming capacity
((C))Soap forming capacity
D. Soap dissolving capacity
Ans. B

Que. Magnesium bicarbonate on boiling forms_____.
A. $MgCO_3+CO_2+H_2O$
B. $MgCO_3+CO_2$
((C)) $Mg(OH)_2+CO_2$
D. $MgCO_3+Mg(OH)_2$
Ans. C

Que. Hardness of water is determined by _____.
A. EDTA Method
B. Volhard's Method
((C))Mohr's Method
D. Iodometric titration Method
Ans. A

Que. In the determination of hardness of water Na_2EDTA is used instead of EDTA because_____.
((A) Na_2EDTA)is tetradentate and EDTA is bidentate
B. Na_2EDTA is cheap than EDTA
((C)) Na_2EDTA is colourless and EDTA is coloured
D. Na_2EDTA is easily soluble in water than EDTA
Ans. D

Que. M-EDTA complex is_____.
A. Neutral
B. Negatively charged
((C))Positively charged
D. None of these
Ans. B

Que. Hard water---------
A. Forms lather readily
B. Does not form lather easily
C. Precipitates out on to soap
D. Dissolves the soap completely
Ans. B

Que. Temporary hardness of water is due to------
A. Chlorides

B. Bicarbonates and some soluble carbonates
C. Nitrates and some soluble gases
D. Heavy metal salts
Ans. B

Que. The hardness causing salts are expressed in terms of----------
A. $MgCO_3$
B. $CaCl_2$
C. $CaCO_3$
D. $Ca(HCO_3)_2$
Ans. C

Que. EDTA means---------
A. Eriochrome diethylene tetraacetic acid
B. Ethyl diacetate acetic acid
C. Eriochrome diamine tetraethyl acetic acid
D. Ethylene diammine tetra acetic acid
Ans. D

Que. Complex formation in EDTA method involves-----
A. Formation of ionic bonds with cations and ligands
B. Formation of a ring like compound with ligands
C. Formation of a ring like structure with cations and donating species
D. Formation of a structure with metal in the centre and ligands
Ans. D

Que. Temporary hardness in water can be removed due to boiling because
A. The hardness causing salts get decomposed
B. They can become non-hardness causing
C. The salts can evaporate along with water
D. The salts get converted to permanent hardness causing salts
Ans. A

Que. Standard hard water means water containing
A. 1 mg of hardness causing salts per ml
B. 1 mg of hardness causing salts per litre
C. 1 ppm of hardness causing salts per litre
D. 100 mg $CaCO_3$ per 1000ml
Ans. D

Que. The alkalinity in water cannot be due to
A. OH- ions
B. CO_3^{2-}
C. CO_3^{2-} and HCO_3^- both
D. OH- and HCO_3
Ans. D

Que. When Phenolphthalein alkalinity = 0
A. Phenolphthalein should be used
B. Phenolphthalein and methyl orange both should be used
C. Methyl orange only
D. No indicator is required
Ans. C

Que. 1M Na_2EDTA =---------- $CaCO_3$
A. 10 g
B. 100g
C. 1000g
D. None of these
Ans. B

Que. A method of water softening that removes hardness ions and replaces them with sodium ions that does not affect soap is
A. Washing soda addition
B. Calgon conditioning
C. Zeolite method
D. All of the above
Ans. D

Que. 1 ppm $CaCO_3$ equivalent hardness is meant by
A. 10 mg/lit $CaCO_3$ eq.
B. 100 mg/lit $CaCO_3$ eq.
C. 1 mg/lit $CaCO_3$ eq.
D. 10^3 mg/lit $CaCO_3$ eq.
Ans. C

Que. Hardness of water for high pressure boilers in term of ppm CaCO3 eq. should be
A. 0-10
B. 10-25
C. 25-50
D. above 50
Ans. A

Que. Total hardness is sum of
A. Concentrations of all the salts present
B. Concentrations of calcium and Mg salts present
((C))Temporary hardness and permanent hardness
D. Concentrations of impurities present in the water
Ans. C

Que. In EDTA titration addition of buffer solution maintains
A. Alkalinity
B. Acidity
C. pH
D. Neutrality
Ans. C

Que. The combinations of alkaline salts present in water can not be
A. OH^- and CO_3^{-2}
B. OH^- and $H\,CO_3^-$
C. $H\,CO_3^-$ and CO_3^{-2}
D. None of these
Ans. B

Que. OH^- ions imparts_____to water.
A. Permanent Hardness
B. Temporary hardness
C. Alkalinity
D. Colour
Ans. C

Que. In determination of alkalinity using dual indicator method, if P=M, OH^- alkalinity is equal to_____.
A. 2P
B. M
C. M-2P
D. 2P-M
Ans. B

Que. In determination of alkalinity using dual indicator method, if P=0, HCO_3^- alkalinity is equal to_____.
A. 2P
B. M
C. M-2P
D. 2P-M
Ans. B

Que. In determination of alkalinity using dual indicator method, if P=1/2M, CO_3^{--} alkalinity is equal to_____.
A. 2P
B. M
C. M-2P
D. 2P-M
Ans. A

Que. In determination of alkalinity using dual indicator method, if P < 1/2M, CO_3^{--} alkalinity is equal to_____.
A. 2P
B. M
C. M-2P
D. 0
Ans. A

Que. In determination of alkalinity using dual indicator method, if P > 1/2M, CO_3^{--} alkalinity is equal to_____.
A. 2P
B. 2 (M-P)
C. M-2P
D. 0
Ans. B

Que. In determination of alkalinity using dual indicator method, if P > 1/2M, HCO_3^- alkalinity is equal to_____.
A. 2P
B. 2 (M-P)
C. M-2P
D. 2P-M
Ans. D

Que. In determination of alkalinity using dual indicator method, if P < 1/2M, OH^- alkalinity is equal to_____.
A. 2P
B. 2 (M-P)
C. M-2P
D. 2P-M
Ans. C

Que. 1 ppm hardness is one part of $CaCO_3$ equivalent hardness present in_____.
A. 10^{-6} parts of water
B. 10^6 parts of water
C. 10^3 parts of water
D. 10^{-3} parts of water Ans. B

Que. Match the following.

1. Foamig	P. Boilers
2. EDTA	Q. Sticky
3. Scales	R. EBT
4. Priming	S. Castor oil

A. 1-S ,2-R , 3-Q , 4-P
B. 1-R ,2-S , 3-P , 4-Q
C. 1-S ,2-R , 3-P , 4-Q
D. 1-S ,2-P , 3-Q , 4-R
Ans.

Que. Upon boiling hard water bicarbonatese decomposed to yield_____.
A. insoluble chlorides
B. soluble chlorides
C. insoluble carbonates or hydroxides
D. soluble carbonates or hydroxides
Ans. B

Que. 10mg/lit is equal to _____.
A. 0.1ppm
B. 1ppm
C. 10ppm
D. 100ppm
Ans. C

Que. 100 ml of water sample requires 15 ml of 0.05N HCl for the end point using phenolphthalein and methyl orange indicator. Find the total alkalinity of water.
A. 250ppm
B. 275ppm
C. 300ppm
D. 375ppm
Ans. D

Que. If the total hardness of water is 380ppm and non-carbonate hardness of water is 300ppm then permanent hardness of water is_____.
A. 80ppm
B. 300ppm
C. 680ppm
D. None of these
Ans. B

Que. 50 ml of water sample requires 10 ml of 0.01N HCl for the end point using phenolphthalein and another 5ml for methyl orange indicator. Find the total alkalinity of water.
A. 150 ppm
B. 200 ppm
C. 250 ppm
D. 300 ppm
Ans. A

Que. 50 ml of water sample requires 6 ml of 0.01N HCl for the end point using phenolphthalein and another 4 ml for methyl orange indicator. Find the total alkalinity of water.
A. 100 ppm
B. 200 ppm
C. 300 ppm
D. 400 ppm
Ans. A

Que. Which indicator is used in the determination of alkalinity of water
A. phenolphthalein and methyl orange
B. starch
C. EBT
D. all of these
Ans. A

Que. Unit of hardness of water is _____
A. ppm
B. ppb
C. mg/litre
D. all of them
Ans.

Que. Permanent hardness is due to dissolved calcium and magnesium salts of _____
A. chlorides
B. nitrates
C. sulphates
D. all of them
Ans. D

Que. Permanent hardness is not imparted to water due to _____
A. chlorides
B. sulphates
C. bicarbonates
D. nitrates
Ans. C

Que. Soap consuming capacity of water is called as ----
A. corrosion
B. Softness of water
C. Hardness of water
D. alkalinity
Ans. C

Que. Alkaline hardness is also called as----
A. non-carbonate hardness
B. carbonate hardness
C. permanent hardness
D. none of these
Ans. B

Que. Alkalinity is measured volumetrically by titration of sample water against a standard solution of -----
A. Sulphuric acid
B. silver nitrate
C. sodium thiosulphate
D. ferrous ammoniu sulphate
Ans. A

Que. Hardness of water is expressed in terms of equivalent of ----
A. calcium chloride
B. magnesium chloride
C. calcium carbonate
D. magnesium carbonate
Ans. C

UNIT IB

Que. To avoid corrosion due to dissolved oxygen, water is treated with_____.
A. $CaCO_3$
B. $CuSO_4$
C. Na_2SO_3
D. $KMnO_4$
Ans. C

Que. Dissolved CO_2 from water is removed by adding suitable amount of _____.
A. NH_3
B. CO_2
C. H_2S
D. H_2O
Ans. A

Que. To prevent corrosion due to acid formation the pH of the boiler feed water is maintained in between_____.
A. 2 to 4
B 8. 5 to 9
C 3. 5 to 7
D. 11. 5 to 14
Ans. B

Que. Galvanic corrosion can be avoided by suspending_____plates.
A. Steel
B. Chromium
C. Silver
D. Zinc
Ans. D

Que. When boiler produces steam rapidly, some water droplets are carried along with steam. This process of wet steam formation is called as_____.
A. Carry over
B. Foaming
C. Priming
D. Sludge formation
Ans. C

Que. Foaming is formation of continuous _____on the surface of water.
A. Steam
B. Sludge
C. Droplets
D. Foam
Ans. D

Que. Priming and foaming reduces _____.
A. Efficiency of machines.
B. Hardness of water.
C. Alkalinity of water.
D. Chloride content in water.
Ans. A

Que. The slimy and loose deposits of precipitated salts in a boiler tube is known as_____.
A. Scale
B. Sludge
C. Priming
D. Carry over
Ans. B

Que. Carry over is the alternative name for_____.
A. Sludge formation
B. Corrosion
C. Scale formation
D. Priming and foaming
Ans. D

Que. The hard and strong coating formed inside the boiler tube by chemical reaction is called as_____.
A. Sludge
B. Scale
C. Carry over
D. Hard water
Ans. B

Que. Normally sludge formation is towards the_____parts of the boiler tube.
A. Hotter
B. Bottom
C. Cooler
D. Middle
Ans. C

Que. The fast corrosion of boiler caused by highly alkaline condition of water is called as_____.
A. Osmosis
B. Evaporation
C. Precipitation
D. Caustic embitterment
Ans. D

Que. Caustic embrittelment can be avoided by treating boiler feed water with _____.
A. Sodium carbonate
B. Sodium phosphate
C. Sodium chloride
D. Sodium sulphate
Ans. B

Que. Scales are generally formed at _____parts of the boiler tube.
A. Upper
B. Side
C. Hotter
D. Middle
Ans. C

Que. Scale forming salts like $CaSO_4$, $Mg(HCO_3)_2$ in the boiler water can be converted into highly soluble complexes by adding_____.
A. Calgon
B. $MgSO_4$
C. Na_2CO_3
D. $CuSO_4$
Ans. A

Que. By adding_____at a boiler temperature, it is possible to form

gelatinous precipitate of scale and sludge forming salts.
A. Sodium carbonate
B. Sodium sulphate
C. Sodium aluminate
D. Sodium hydroxide
Ans. C

Que. By using_____chelating compound scales and sludges can be converted into soluble complexes.
A. Na_2CO_3
B. EDTA
C. Na_2PO_4
D. $CaCO_3$
Ans. B

Que. Due to scale and sludge deposition in boiler efficiency of boiler_____.
A. Increases
B. Decreases
C. Remains same
D. All of these
Ans. B

Que. Sludge's are formed by substances which have
A. More solubility in cold water
B. More solubility in acidic water
C. More solubility in hot water
D. More solubility in alkaline water
Ans. A

Que. The permitted hardness for water used in high pressure boilers is
A. 10-20 ppm
B. 2-3 ppm
C. 0-10 ppm
D. 15-50 ppm
Ans. B

Que. Blow-down operation means
A. Replacing salt water with fresh air
B. Replacing salt water with fresh water
C. Blowing air strongly through boiler
D. Blowing down hot and hard water
Ans. B

Que. Organic substances like tannin are added to
A. Minimize scale formation
B. Maximize sludge formation
C. Form a coating on scales
D. Prevent scales and sludges
Ans. C

Que. Caustic embrittlement is the boiler phenomenon in which
A. Corrosion of boiler due to sodium phosphate occurs
B. Corrosion of boiler due to calgon occurs
C. Corrosion of boiler due to sodium aluminate occurs
D. Corrosion of boiler due to sodium hydroxide and soda lime occurs
Ans. D

Que. The type of phosphates used for acidic water is:
A. NaH_2PO_4
B. Na_2PO_4
C. Na_3PO_4
D. $NaHPO_4$
Ans. C

Que. Presence of silica in boiler water causes
A. Sludge formation
B. priming
C. foaming
D. scale formation
Ans. D

Que. Buffer solution is added during complexometric titration to maintain pH=10
A. Since EBT shows a blue colour at such pH
B. The metal EDTA complex is stable
C. The H+ ions released during complex formation are balanced by the buffer solution
D. All the above reasons
Ans. D

Que. Dissolved oxygen in water
A. Promotes corrosion
B. Increases boiler life

C. Reacts with salts in water
D. Reduces the hardness of water
Ans. A

Que. Hydrazine reacts with dissolved oxygen to form
A. Ammonia
B. Nitrogen gas and water
C. Sodium sulphite
D. Ammonium hydroxide
Ans. B

Que. To remove CO_2 from boiler feed water
A. Ammonia is used
B. Sodium sulphide is used
C. N_2H_4 is used
D. Sodium carbonate is used
Ans. A

Que. Wet steam means
A. Priming
B. Foaming
C. Steaming
D. Deaerating
Ans. A

Que. At high temperatures of water
A. $CaSO_4$ dissolves sufficiently
B. $CaSO_4$ precipitates out as a scale
C. $CaSO_4$ delocalizes as sludge
D. $MgCl_2$ does not hydrolyze
Ans. B

Que. Water Analysis is an important topic of study since
A. Water is available everywhere
B. Water has numerous industrial applications
C. The nature of water affects all living beings
D. All of the above
Ans. D

Que. At the cooler portions of the boiler_____are formed/occurred.
A. Scales
B. Sludges
C. Corrosion
D. Caustic embrittlement
Ans. B

Que. The use of Na_2CO_3 in boilers leads to
A. Formation of $NaHCO_3$
B. Formation of NaOH
C. Formation of Na_3PO_4
D. All the above
Ans. B

Que. Corrosion of boiler is caused by feed water containing
A. O_2
B. CO_2
C. salts of weak base-strong acid
D. all of these
Ans. D

Que. The preferred chemical for removing O_2 gas dissolved in boiler feed water is
A. Na_2SO_4
B. N_2H_4
C. Na_2S
D. NH_3
Ans. B

Que. The chemical used for removing dissolved O_2 in boiler feed water is
A. Hydrazine
B. Sodium alluminate
C. alum
D. sodium phosphate
Ans. A

Que. Removal of dissolved CO_2 from the boiler feed water is done by adding
A. soda
B. ammonia
C. oxygen
D. $NaAlO_2$
Ans. B

Que. Presence of salt of weak base-strong acid in the boiler feed water causes the main problem
A. caustic embrittlement
B. priming
C. sludges formation
D. scale formation
Ans. A

Que. Priming in boilers can be prevented by
A. adding anti foaming agent in boiler feed water
B. maintaining low level of water in boiler
C. avoiding changes in steam generation rate & pressure
D. all of the above
Ans. A

Que. Blow down operation is used to minimize
A. scale formation in boiler
B. sludge's deposition in boiler
C. avoiding fast corrosion of boiler
D. avoiding wet steam formation
Ans. A

Que. Caustic embrittlement in high pressure boiler is caused by
A. use of higher hardness in water
B. presence of soda in feed water
C. presence of weak base – strong acid salts in feed water
D. all of the above
Ans. B

Que. Scales are removed by_____.
A. Wire brushes
B. Hammer and chisel
C. Shock treatment
D. All of these
Ans. D

Que. Priming occurs due to _____
A. high steam velocity
B. improper boiler design
C. sudden increase in steam rate
D. all of them
Ans. D

Que. Scales are formed due to _____
A. presence of silica
B. presence of nitrogen
C. presence of oxygen
D. presence of carbon
Ans. A

Que. Decomposition of bicarbonates is responsible for _____
A. sludge formation
B. boiler corrosion
C. priming foaming
D. scale formation
Ans. D

Que. Efficiency of boiler decrease due to _____
A. scale formation
B. use of soft water
C. antifoaming agents
D. sodalime treatment
Ans. A

Que. Formation of NaOH in boiler water results into _____
A. priming
B. phosphate conditioning
C. boiler corrosion
D. caustic embrittlement
Ans. D

Que. Caustic embrittlement can be avoided by using _____
A. sodium phosphate
B. sodium bicarbonate
C. sodium sulphate
D. sodium chloride
Ans. A

Que. Boiler troubles are---
A. Priming and Foaming
B. scale and sludge formation
C. Boiler corrosion
D. all of them
Ans. B

Que. Blow down operation is carried out to remove----
A. accumulated sludge
B. accumulated acid
C. distilled water
D. exhausted zeolite
Ans. A

UNIT IC

Que. The following treatment of water is internal treatment.
A. Zeolite
B. Ion Exchange process
C. Calgon conditioning
D. Osmosis
Ans. C

Que. The other name of zeolite process is _____process.
A. Ion exchange
B. Permutit
C. Demineralization
D. Coagulation
Ans. B

Que. Sodium zeolite is actually_____.
A. Sodium Silicate
B. Aluminium Silicate
C. Calcium Silicate
D. Hydrated Sodium Alumino Silicate
Ans. D

Que. Exhausted zeolite bed can be regenerated by_____.
A. 5% NaCl
B. 10 % NaCl
C. 100 % NaCl
D. 20 % NaCl
Ans. B

Que. Brine is nothing but_____.
A. 5% NaCl
B. 10 % NaCl
C. 100 % NaCl
D. 20 % NaCl
Ans. B

Que. Zeolites are_____like structures.
A. Square
B. Triangular
C. Honey Comb
D. Pyramid
Ans. C

Que. Zeolite is basically_____process.
A. Cation Exchange
B. Anion Exchange
C. Water Exchange
D. Ion Exchange
Ans. A

Que. Zeolite process can not be used for water containing_____impurities.
A. Dissolved
B. Biological
C. Suspended
D. Colloidal
Ans. D

Que. 8 % NaCl solution means _____.
A. 8 g/lit
B. 80 g/lit
C. 0. 8 g/lit
D. 0. 08 g/lit
Ans. B

Que. Other name of Ion Exchange process is_____.
A. Permutite
B. Zeolite
C. Deionization
D. Osmosis
Ans. C

Que. By using Ion Exchange process _____can be exchangeD.
A. Cations
B. Anions
C. Cations and anions both
D. None of these
Ans. C

Que. The exhausted cation exchanger can be regenerated by_____.
A. NaCl
B. Dil. HCl
C. KCl
D. $CaCl_2$
Ans. B

Que. The exhausted anion exchange resins can be regenerated by_____.
A. Dil. NaOH
B. $Ca(OH)_2$

C. Conc. KOH
D. $CaSO_4$
Ans. A

Que. The process of removing _____from water is called Desalination.
A. KCl
B. NaCl
C. $CaCl_2$
D. $BaCl_2$
Ans. B

Que. In_____method concentration of brine decreases by applying direct electric current.
A. Ion exchange
B. Zeolite
C. Electrodialysis
D. Osmosis
Ans. C

Que. Desalinated brine is removed from _____compartment.
A. Central
B. First
C. Last
D. None of these
Ans. A

Que. In osmosis flow of liquid is from _____solution.
A. Dilute to concentrated
B. Concentrated to dilute
C. Top to bottom
D. None of these
Ans. A

Que. In reverse osmosis flow of liquid is from_____solution.
A. Dilute to concentrated
B. Concentrated to dilute
C. Top to bottom
D. None of these
Ans. B

Que. In reverse osmosis the direction of the flow is getting reversed as hydrostatic pressure is_____than osmotic pressure.
A. Low
B. Very low
C. Greater
D. None of these.
Ans. C

Que. In osmosis process, after completion, in the tank_____is present.
A. Pure water
B. Mixture
C. Contaminated water
D. None of these
Ans. C

Que. In reverse osmosis,_____.
A. Sewage water is purified
B. Industrial waste water is purified
C. Sea water is purified
D. River water is purified
Ans. C

Que. Reverse osmosis is also known as _____.
A. Super filtration
B. Hyper filtration
C. Pressure filtration
D. Molecular sieve filtration
Ans. B

Que. Electrodialysis is a method adopted to_____.
A. Remove high concentration of ions in saline water
B. Remove pathogenic bacteria
C. Remove salts
D. Purify water
Ans. A

Que. To remove_____impurities from water internal/external treatments are to be given.
A. Colloidal
B. Suspended
C. Biological
D. Dissolved
Ans. D

Que. Zeolite process cannot be used for _____salts.
A. Ca
B. Mg

C. Ca/Mg
D. Mn/Fe
Ans. D

Que. Zeolite process can only be used for _____.
A. Colourless water
B. Yellow coloured water
C. Blue coloured water
D. All of these
Ans. A

Que. Calgon conditioning means to add
A. Scale forming salts in water
B. $(NaPO_3)_6$
C. $NaHPO_4$
D. Na_2HPO_4
Ans. B

Que. Zeolites work on the principle of
A. Cation exchange
B. Anion exchange
C. Silicate exchange
D. Iron exchange
Ans. A

Que. Zeolites are
A. Hydrated iron silicates
B. Hydrated sodium alumino silicates
C. Hydrated magnesium oxides
D. Hydrated alumino hydroxides
Ans. B

Que. Regeneration of zeolite bed can be done by
A. Running $CaCl_2$ solution through it
B. Running 10% $CaCl_2$ solution through it
C. Running NaCl solution through it
D. Running $CaCl_2$ solution through it then pure water
Ans. C

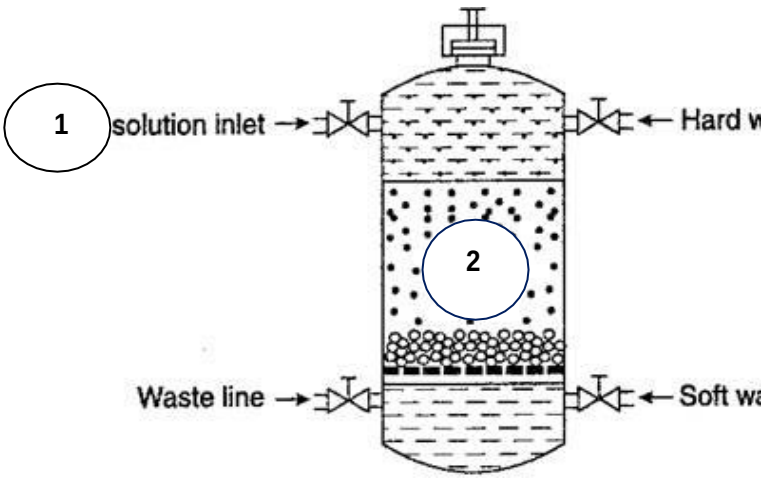
Que. The cation exchanger resins are sulphonated or carboxylated so as to
A. Get them in a bead like form
B. Have loosely held H^+ ions on to them
C. Have exchange cations on them
D. Make long chain polymers of them
Ans. C

Que. To regenerate a cation exchange resin
A. Dil HCl is added
B. Dil NaOH is added
C. Fresh 10% brine is added
D. Soft water is blown down
Ans. A

Que. Regeneration of cation exchanger resin reaction is
A. $H_2R + 2Na^+ \longrightarrow Na_2R + 2H^+$
B. $RCl_2 + 2\ NaOH \longrightarrow R(OH)_2 + 2\ NaCl$
C. $Na_2R + 2\ HCl \longrightarrow H_2R + 2NaCl$
D. $H_2R + 2Ca \longrightarrow CaR + 2H^+$
Ans. C

Que. Water is passed through a cation exchange resin first because
A. It is easier to use
B. It is cost effective
C. It produces acidic water
D. Water from here does not spoil anion exchange beads
Ans. D

Que. In the fig. given below, identify what could be present at locations 1 and 2 in the zeolite process



A. 1-$NaHPO_4$,2- NaCl
B. 1-Na_3PO_4 , 2-NaCl
C. 1-Sodium aluminosilicate, 2- NaCl
D. 1-NaCl,2- Sodium aluminosilicate
Ans. D

Que. Reverse Osmosis works in the

A. Molecular range
B. Ionic range
C. Particle range
D. Macromolecular range
Ans. D

Que. Osmosis describes the
A. Movement of solutions having different concentration
B. Movement of solution from high to low concentration
C. Movement of solvent between two solutions having different concentrations
D. Movement of solvent between two solutions having similar concentrations
Ans. C

Que. Electrodialysis process requires
A. Number of cell pairs with electrodes and semipermeable membrane
B. Only a semipermeable membrane
C. Pressure and electric field
D. Electrodes only
Ans. A

Que. Brackish water means
A. Salty water
B. Pure water
C. Distilled water
D. Ion-free water
Ans. A

Que. Reverse Osmosis removes
A. Ionic matter
B. Non-ionic matter
C. High molecular wt. organic matter
D. All of the above
Ans. D

Que. In phosphate conditioning scales are converted into
A. loose ppt
B. soluble complex
C. gases
D. silicates
Ans. A

Que. RO process involves
A. solvent moves from solution of higher conc. to lower conc. through semipermeable membrane
B. solute molecules move from solution of higher conc. to lower conc. through semipermeable membrane
C. solvent moves from lower conc. to higher conc.
D. solute molecules move from solution of lower conc. to solution of higher conc. through semipermeable membrane
Ans. C

Que. Internal treatment method involves
A. Zeolite treatment
B. Phosphate conditioning
((C))Ion exchange method
D. None of the above
Ans. D

Que. The demineralization process involves treatment of water with
A. Cation exchanger
B. Anion exchanger
((C))Both cation and anion exchanger
D. Adsorbents
Ans. C

Que. How many litres of NaCl will be required to regenerate a zeolite bed which has capacity of softening 2500 L of water of 400 mg $CaCO_3$ equivqlent hardness per litre. Concentration of NaCl = 50,000 ppm of $CaCO_3$ equivqlent.
A. 2 L
B. 200 L
C. 20 L
D. 0.2 L
Ans. C

Que. How many litres of NaCl will be required to regenerate a zeolite bed which has capacity of softening 1000 L of water of 250 mg $CaCO_3$ equivqlent hardness per litre. Concentration of NaCl = 25,000 ppm of $CaCO_3$ equivqlent.
A. 0.1 L
B. 1 L

C. 10 L
D. 100 L
Ans. C

Que. Zeolite softener was completely exhausted and was regenerated by passing 90 L of NaCl solution containing 585 mg/L NaCl. How many litres of sample water of hardness 100 ppm can be soften by this softener ?
A. 400 L
B. 450 L
C. 475 L
D. 540 L
Ans. B

Que. Zeolite softener was completely exhausted and was regenerated by passing 60 L of NaCl solution containing 1170 mg/L NaCl. How many litres of sample water of hardness 200 ppm can be soften by this softener ?
A. 60 L
B. 66 L
C. 600 L
D. 660 L
Ans. C

Que. A zeolite bed gets exhausted by softening 2500 L of water sample and requires 10 L of 5 % NaCl for regeneration. Find the hardness of water sample.
A. 177 ppm
B. 711 ppm
C. 117 ppm
D. 171 ppm
Ans. D

Que. Which of the following statement is true for the electrodialysis process
1) electrodialysis uses semipermeable membrane to remove contaminants
2) electrodialysis uses an electric current to remove contaminants
3) in the process cell pair consists of membranes that will either allow cations or anions to passs through
4) electrodialysis is bases on reverse osmosis phenomenon

A. 1 and 3
B. 2 and 4
C. 1 and4
D. 2 and 3
Ans. D

Que. If 5 % NaCl solution is used for regeneration of zeolite.Calculate the amount of CaCO3 equivalent hardness which can be removed by 1 litre of NaCl solution
A. 42.735 mg
B. 42735 mg
C. 4.2735 gm
D. 42735 gm
Ans. B

Que. Electrodialysis is usually applied for _____
A. sea water desalination
B. drinking water production C. recycling of industrial waste
D. all of these
Ans. D

Que. Reverse osmosis is a process in which ____
A. contaminants are removed from water
B. water is separated from its contaminants
C. hardness of water is removed
D. dissolved gases from water is removed
Ans. B

Que. The process used to decrease concentration of salts in water by applying direct electric current is _____
A. Ion exchange
B. Reverse osmosis
C. Electrodialysis
D. osmosis
Ans. C

Que. The process of removing salts from brackish water is _____
A. desalination

B. demineralisaion
C. distillation
D. de-ionisation
Ans. A

Que. Cation exchange resin is denoted as _____
A. $R(OH)_2$
B. RH_2
C. ROOH
D. RCOH
Ans. B

Que. Anion exchange resin is denoted as _____
A. $R(OH)_2$
B. RH_2
C. ROOH
D. RCOH
Ans. A

Que. External water treatments include _____
A. lime-soda process
B. zeolite process
C. ion exchange process
D. all of these
Ans. D

Que. Preferred pH range for zeolite treatment is _____
A. 1
B. 4
C. 7
D. 10
Ans. D

Que. Colloidal conditioning can be done by using _____
A. agar agar
B. tannin
C. lignin
D. all of them
Ans. D

Que. Internal treatment does not include _____
A. phosphate conditioning
B. zeolite conditioning
C. colloidal conditioning
D. carbonate conditioning
Ans. B

Que. Reverse osmosis is used to separate _____
A. Pure water from less pure solution
B. impure water from river water
C. impure water mixed in pure water none of these
D. A
Ans.

Que. In reverse osmosis, two solutions are separated by _____
A. sand filter
B. salt bridge
C. semi permeable membrane
D. permeable membrane
Ans. C

Que. Reverse osmosis membranes are prepared from _____
A. cellulose acetate
B. polyamide
C. polysulphonate
D. all of them
Ans. D

Que. The meaning of Zeolite is---
A. Freezing stone
B. Boiling stone
C. Sand stone
D. melting stone
Ans. B

Que. When zeolite is completely converted into calcium and magnesium zeolite it is---
A. exhausted
B. tired
C. expired
D. drained
Ans. A

Que. Brackish water mostly contains dissolved---
A. Ca salts
B. Mg salts
C. NaCl salts
D. Suspended impurities
Ans. C

Que. The process of removing common salt from water is called----
A. desalination
B. demineralization
C. deactivation
D. de-aeration
Ans. A

Que. In electrodialysis concentration of brine in the central compartment----
A. remains constant
B. decreases
C. increases
D. none of these
Ans. B

Que. In electrodialysis concentration of brine in the two side compartments----
A. increases
B. decreases
C. remains constant
D. none of these
Ans. A

UNIT ID

Que. In the preparation of adipic acid traditionally_____is useD.
A. Benzene
B. Chlorobenzene
C. Glucose
D. None of these
Ans. A

Que. In the preparation of adipic acid by using green and clean technology _____useD.
A. Benzene
B. Chlorobenzene
C. Glucose
D. None of these
Ans. C

Que. In urathanes, isocynates and polycarbonate synthesis traditionally _____is used
A. Chloride
B. Phosgene
C. H_2S
D. CO_2
Ans. B

Que. By green chemistry route, polycarbonates are prepared by using _____.
A. Chloride
B. Phosgene
C. H_2S
((D)DPC
Ans. D

Que. Traditional way of synthesizing indigo dye is with_____as starting material.
A. Benzene
B. Aniline
C. Chlorobenzene
D. None of these
Ans. B

Que. In green chemistry approach, aniline is replaced by_____in the preparation of indigo.
A. Chlorobenzene
B. Benzene
C. L-tryptophan
D. Aniline.
Ans. C

Que. The concept of Green Chemistry was developed by_____.
A. Bragg
B. Paul Anestas
C. Mendeleef

D. Dalton
Ans. B

Que. Which of the following is not one of the principles of green chemistry
A. Prevent waste
B. Use renewable feedstocks
C. Use protecting groups
D. Design reactants and products to resist degradation
Ans. D

Que. Which of the following is not a goal of Green Chemistry
A. To achieve better atom economy
B. To develop products which are less toxic
C. To study mechanism of reactions
D. to improve energy efficiency of reactions
Ans. C

Que. Green chemistry research is for
A. alternative renewable feed stock
B. alternative conditions of reaction
C. alternative reagents & transformations
D. all of these
Ans. D

Que. Benzene as starting material is nor preferred for production of adipic acid because it is
A. non renewable
B. Carcinogenic
C. costly
D. all of these
Ans. D

Que. Number of principles proposed by Paul Anastis in green chemistry concept are
A. 4
B. 8
C. 12
D. 16
Ans. C

Que. Match the following.
1. Green chemistry P. Frost
2. Atom economy Q. Komiya Et al.
3. Adipic acid R. Paul Anastas
4. Polycarbonate S. Trost
A. 1-R ,2-Q , 3-P , 4-S
B. 1-R ,2-S , 3-P , 4-Q
C. 1-P ,2-Q , 3-R , 4-S
D. 1-S ,2-P , 3-R , 4-Q
Ans. B

Que. Match the following.
1 Adipic acid U. Calcium carbonate
2. Polycarbonate V. Cyclohexanol
3. Indigo dye W. Phosgene
4. Standard hard water X. Chloroacetic acid
A. 1-W ,2-U , 3-V , 4-X
B. 1-V ,2X- , 3W- , 4-U
C. 1-V ,2-W , 3-X , 4-U
D. 1-V ,2-U , 3-W , 4-X
Ans. C

Que. Match the following.
1 D-Glucose M. Aniline
2. Tryptophan N. Phosgene
3. Diphenyl Carbonate O. E-coli
4. Metal Catalyst, high pressure P. Benzene
A. 1-N ,2-M , 3-P , 4-O
B. 1-O ,2-M , 3-N , 4-P
C. 1-N ,2-O , 3-M , 4-P
D. 1-P ,2-M , 3-N , 4-O
Ans. D

Que. Match the following.
1 D-Glucose M. Aniline
2. Tryptophan N. Phosgene

3. Diphenyl Carbonate O. E-coli
4. Metal Catalyst, high pressure P. Benzene
A. 1-N ,2-M , 3-P , 4-O
B. 1-O ,2-M , 3-N , 4-P
C. 1-N ,2-O , 3-M , 4-P
D. 1-P ,2-M , 3-N , 4-O
Ans. D

Que. The formula of phosgene is _____.
A. $CaCl_2$
B. $COBr_2$
C. $CONH_2$
D. $COCl_2$
Ans. D

Que. Which of the following statement is true for the synthesis of polycarbonate
1) monomer phosgene is used for synthesis
2) phosgene is not toxic
3) process is relatively less energy intensive
4) methylene chloride is used as a solvent
A. 1 and 4
B. 3 and 4
C. 2 and 3
D. 1 and 3
Ans. A

Que. Which of the following statement is true for the synthesis of indigo dye
1) use of non toxic aniline
2) use of chlorinated hydrocarbons
3) production of very less amount of waste salts
4) use of toxic aniline
A. 1 and 3
B. 2 and 3
C. 2 and 4
D. 1 and 2
Ans. C

Que. Choose the correct statement of zeolite process
1.equipment used is compact
2. process can be used for highly acidic and alkaline water sample
3. no impurities are precipitated, so no sludge formation
4. process can be used for water containing iron and manganese salts
A. 1 and 2
B. 2 and 3
C. 2 and 4
D. 1 and 4
Ans. C

Que. The reaction efficiency parameter which considers the waste produced is ____
A. % conversion
B. environmental load factor
C. % yield
D. all of these
Ans. B

Que. Good atom economy means_____
A. lesser problems of waste treatment
B. better quality of product
C. less quantity of reactants
D. process bassed on nonrenewable resources
Ans. A

Que. The catalyst used to synthesise adipic acid in green pathway is _____
A. Bacteria
B. E-coli
C. tenericutes
D. actiono bacteria
Ans. B

Que. Safer solvents for green chemistry are___-
A. Regenerative
B. non inflammable
C. non carcinogenic
D. all of these
Ans. D

Que. Green chemistry eliminates waste _____
A. at the end of the process
B. at source
C. somewhere in the middle of the process

D. nothing to do the waster remediation
Ans. B

Que. Ideal synthesis should be _____
A. atom efficient
B. safe one step
C. involving no wasted reagents
D. all the above are correct
Ans. D

Que. Green chemistry is _____
A. Chemistry of green matter in nature
B. details of chemical reaction
C. chemistry for safety and wellbeing of man kind
D. mechanism and kinetic study of reaction
Ans. C

Que. Green chemistry provides best opportunity to carry out work in _____
A. quantitative and qualitative analysis
B. economical and environmentally beneficial way
C. both a and b
D. none of these
Ans. C

Que. The synthesis of indigo by green pathway involves ____
A. Enzymatic transformation
B. catalytic transformation
C. cyclic transformation
D. synthetic transformaiton
Ans. A

Que. Which of the following is a green fuel?
A. Petrol
B. Power alocohol
C. Diesel
D. Biodiesel
Ans. D

Que. The Principle of green chemistry is _____
A. design for energy efficiency
B. new analytical method
C. reducing toxicity of products
D. all of these
Ans. D

Que. The E-factor in a reaction should be _____
A. maximum
B. minimum
C. average
D. none of these
Ans. B

Que. Greener pathways _____
A. utilizes non renewable inputs
B. eliminates hazardous by-products
C. utilize more disposal cost
D. none of these
Ans. B

Que. E-factor ignores _____
A. recycle solvents
B. reused catalysts
C. both a and b
D. none of these
Ans. C

Que. Green chemistry is also known as _____
A. Environmental science
B. Ecology science
C. Environmental chemistry
D. none of these
Ans. D