

ENGINEERING CHEMISTRY

(WATER)

This set of Engineering Chemistry Multiple Choice Questions & Answers (MCQs) focuses on “Alkalinity of Water and its Estimation”.

1. Which source of water is free from hardness and surface impurities?

- a) Surface water
- b) Underground water
- c) Rain water
- d) Sea water

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Answer: c

Explanation: Rain water is free from hardness and surface impurities. Surface water and sea water is very impure and saline.

2. Water from reservoirs comes under the category of _____

- a) Surface water
- b) Rain water
- c) Underground water
- d) Sea water

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Answer: a

Explanation: Water from reservoirs comes under the category of surface water. Reservoirs are the large storage tanks which are used for storing and distributing water to the channels.

3. Which of the following indicator is pink in basic medium?

- a) Methyl orange
- b) Phenolphthalein
- c) Starch
- d) Litmus paper

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Answer: b

Explanation: Phenolphthalein indicator is pink in basic medium, methyl orange is orange, starch is colorless and litmus paper shows different colors in different mediums.

4. The temporary hardness in water is due to _____

- a) OH^-
- b) CO_3^{2-}
- c) H^+
- d) HCO_3^-

View Answer

Answer: d

Explanation: The temporary hardness in water is due to HCO_3^- . It can easily be removed by mere action of boiling.

5. With respect to the constituents causing alkalinity in water, which of the following situation never arises?

- a) CO_3^{2-} and HCO_3^- together
- b) HCO_3^- and OH^- together
- c) OH^- only
- d) OH^- and CO_3^{2-} together

View Answer

Answer: b

Explanation: HCO_3^- and OH^- together combines to form CO_3^{2-} ions. Therefore, this situation never arises.

6. What is the disadvantage of using high alkaline water?

- a) It may lead to infections
- b) It may lead to electrolysis
- c) It may lead to caustic embrittlement
- d) It may lead to indigestion

View Answer

Answer: c

Explanation: High alkaline water leads to caustic embrittlement and deposition of precipitates and sludges in boiler tubes and pipes.

7. The alkalinity due to hydroxide ion when $P > M/2$ will be _____

- a) $M-2P$
- b) $2(M-P)$
- c) Nil
- d) $2P-M$

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Answer: d

Explanation: The alkalinity due to hydroxide ion when $P > M/2$ will be $(2P-M)$.

8. The alkalinity due to bicarbonate ion when $P < M/2$ will be _____

- a) $M-2P$
- b) $2(M-P)$
- c) Nil
- d) $2P-M$

[View Answer](#)

Answer: a

Explanation: The alkalinity due to bicarbonate ion when $P < M/2$ will be $(M-2P)$.

9. The alkalinity due to carbonate ion is $2P$ when?

- a) $P = M$
- b) $P > M/2$
- c) $P = M/2$
- d) $P < M/2$

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Answer: c

Explanation: The alkalinity due to carbonate ion is $2P$ when $P = M/2$.

10. Alkalinity is a measure of the ability of water to neutralize the acids.

- a) True
- b) False

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Answer: a

Explanation: Alkalinity is a measure of the ability of water to neutralize the acids. Measuring alkalinity is important in determining a stream's ability to neutralize acidic pollution from rainfall or waste water.

This set of Engineering Chemistry Multiple Choice Questions & Answers (MCQs) focuses on “Hardness of Water”.

1. Hardness of water is due to the presence of salts of _____

- a) Potassium
- b) Chlorine
- c) Magnesium
- d) Boron

[View Answer](#)

Answer: c

Explanation: Hardness of water is due to the presence of salts of calcium and magnesium. Hard drinking water may have moderate health benefits, but can pose serious problems in industrial settings, where water hardness is monitored to avoid costly breakdowns in boilers, cooling towers, and other equipment that handles water.

2. Select the incorrect statement from the following option.

- a) Water which does not form lather with soap and forms white scum is called hard water
- b) Hard water contains dissolved calcium and magnesium salts in it
- c) In hard water, cleansing quality of soap is depressed
- d) Due to the presence of dissolved hardness-producing salts, the boiling point of water is depressed

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Answer: d

Explanation: Due to the presence of dissolved hardness-producing salts, the boiling point of water is elevated. Elevation in boiling point is one of the most important colligative property. All the other options are correct.

3. Select the incorrect statement from the following option.

- a) Permanent hardness is due to dissolved chlorides and sulphates of calcium and magnesium
- b) It can be removed by mere boiling of water
- c) It is also known as non-alkaline hardness

d) The difference between the total hardness and the alkaline hardness gives the non-alkaline hardness

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Answer: b

Explanation: Unlike temporary hardness, permanent hardness is not destroyed on boiling. Various methods are adopted for the removal of permanent hardness like zeolites, lime-soda process etc. All the other options are correct.

4. Alkaline hardness is due to the presence of bicarbonate, carbonate and hydroxides of the hardness-producing metal ions.

a) True

b) False

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Answer: a

Explanation: Alkaline hardness is due to the presence of bicarbonate, carbonate and hydroxides of the hardness-producing metal ions. This is also called carbonate hardness. It is temporary and can be removed easily by boiling.

5. Select the incorrect statement from the following option.

a) The taste of hard water is better than soft water

b) The dissolved calcium in hard water can help to produce strong teeth

c) Hard water coats the lead piping with a layer of insoluble calcium carbonate which prevents poisonous lead dissolving in water

d) Boiler feed water should also be hard in nature

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Answer: d

Explanation: Boiler feed water should be free from hardness otherwise explosion may occur. All the other options are correct. The taste of hard water is better than soft water and dissolved calcium in hard water can help to produce strong teeth. Hard water coats the lead piping with a layer of insoluble calcium carbonate which prevents poisonous lead dissolving in water.

6. Hardness of water is conventionally expressed in terms of equivalent amount of

- a) H_2CO_3
- b) MgCO_3
- c) CaCO_3
- d) Na_2CO_3

View Answer

Answer: c

Explanation: Hardness of water is conventionally expressed in terms of equivalent amount of CaCO_3 . The total water hardness is the sum of the molar concentrations of Ca^{2+} and Mg^{2+} , in mol/L or mmol/L units.

7. The chemical equivalent of MgSO_4 salt is _____

- a) 60
- b) 47.5
- c) 82
- d) 68

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Answer: a

Explanation: The molar mass of MgSO_4 is 120 and its n-factor is 2. So, chemical equivalent = Molar mass/ n-factor = 60.

8. Which of the following is not a unit of hardness?

- a) Parts per million
- b) Degree centigrade
- c) Degree clarke
- d) Degree French

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Answer: b

Explanation: Degree centigrade is not a unit of hardness. Degree centigrade is the unit of temperature. The unit for hardness is ppm (parts per million), degree clarke and degree french. All these three units are inter-related.

9. 1 degree Clarke = 1 part of CaCO_3 per _____ parts of water.

- a) 10,000
- b) 30,000

- c) 50,000
- d) 70,000

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Answer: d

Explanation: 1 degree Clarke = 1 part of CaCO_3 per 70,000 parts of water. It is calculated mathematically.

10. 1 ppm = _____

- a) 0.07 °Fr
- b) 0.7 °Fr
- c) 0.1 °Fr
- d) 0.01 °Fr

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Answer: c

Explanation: 1 ppm = 0.1 °Fr. It is calculated mathematically.

11. How many grams of MgCO_3 dissolved per litre gives 84 ppm hardness?

- a) 70.56 mg/L
- b) 48.23 mg/L
- c) 81.49mg/L
- d) 66.12 mg/L

[View Answer](#)

Answer: a

Explanation: 70.56 mg/L of MgCO_3 dissolved per litre gives 84 ppm hardness.

12. EDTA method for hardness determination is a less accurate and inconvenient procedure.

- a) True
- b) False

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Answer: b

Explanation: EDTA method for hardness determination is a more accurate, convenient and rapid procedure. Ethylene diaminetetraacetic acid (EDTA), is an amino poly-carboxylic acid and a colorless, water-soluble solid.

This set of Engineering Chemistry Multiple Choice Questions & Answers (MCQs) focuses on “Boiler Feed Water”.

1. Water is mainly used in boilers for the generation of _____

- a) Power
- b) Electricity
- c) Steam
- d) Current

[View Answer](#)

Answer: c

Explanation: Water is mainly used in boilers for the generation of steam. This steam is further used in the power plants for the generation of electricity.

2. Which of the following should not be a composition of boiler-feed water?

- a) Hardness should be below 0.2ppm
- b) Its caustic alkalinity should lie between 0.15 to 0.45 ppm
- c) Its soda alkalinity should be 0.45-1 ppm
- d) Its caustic alkalinity should be 1.5-2 ppm

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Answer: d

Explanation: Its caustic alkalinity should be 0.15-0.45 ppm. All the other options are correct. Hardness should be below 0.2ppm, caustic alkalinity should lie between 0.15 to 0.45 ppm and soda alkalinity should be 0.45-1 ppm.

3. Which of the following is not a result of the excess of impurity in boiler-feed?

- a) Scale and sludge formation
- b) Decomposition
- c) Corrosion, priming and foaming
- d) Caustic embrittlement

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Answer: b

Explanation: Excess of impurities in boiler-feed results in scale and sludge formation, corrosion, priming, foaming and caustic embrittlement. It does not contribute to the decomposition process.

4. If the precipitate formed is soft, loose and slimy, these are _____ and if the precipitate is hard and adhering on the inner wall, it is called _____

- a) Sludges, scale
- b) Scale, sludges
- c) Sludges, rodent
- d) Scale, rodent

[View Answer](#)

Answer: a

Explanation: If the precipitate formed is soft, loose and slimy, these are sludges and if the precipitate is hard and adhering on the inner wall, it is called scale. A rodent is a small furry mammal whose teeth never stop growing.

5. Which of the following option is incorrect about the sludges?

- a) Sludges are soft, loose and slimy precipitate
- b) They are non-adherent deposits and can be easily removed
- c) Formed generally at heated portions of the boiler
- d) Can be removed by blow down operation

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Answer: c

Explanation: Sludges are formed generally at colder portions of the boiler. All the other options are correct. Sludges are soft, loose and slimy precipitate, non-adherent deposits and can be easily removed by blow down operation.

6. The scales decrease the efficiency of boiler and chances of explosions are also there.

- a) True
- b) False

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Answer: a

Explanation: The scales decrease the efficiency of boiler and chances of explosions are also there. Scale is the precipitate that is hard and adhering on the inner wall.

7. The propulsion of water into steam drum by extremely rapid, almost explosive boiling of water at the heating surface is called _____

- a) Foaming
- b) Priming
- c) Corrosion
- d) Caustic embrittlement

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Answer: b

Explanation: The propulsion of water into steam drum by extremely rapid, almost explosive boiling of water at the heating surface is called priming. Priming is necessary as it removes all the air voids from the passage of water.

8. The phenomenon during which the boiler material becomes brittle due to accumulation of caustic substances is known as _____

- a) Foaming
- b) Priming
- c) Corrosion
- d) Caustic embrittlement

[View Answer](#)

Answer: d

Explanation: The phenomenon during which the boiler material becomes brittle due to accumulation of caustic substances is known as caustic embrittlement. This can be prevented by using sodium phosphate instead of sodium carbonate as softening reagents.

9. Foaming is caused by the formation of _____

- a) Acids
- b) Alcohols
- c) Oils and alkalis
- d) Ketones

[View Answer](#)

Answer: c

Explanation: Foaming is caused by the formation of oils and alkalis. Oils and Alkalis becomes sticky and greasy on the surface and hence results in foaming.

10. Corrosion is the decay or disintegration of boiler body material either due to chemical or electrochemical reaction with environment.

- a) True
- b) False

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Answer: a

Explanation: Corrosion is the decay or disintegration of boiler body material either due to chemical or electrochemical reaction with environment. It converts a refined metal to a more stable form, such as its oxide, hydroxide, or sulphide.

This set of Engineering Chemistry Multiple Choice Questions & Answers (MCQs) focuses on “Lime Soda Process”.

1. What is the molecular formula of lime?

- a) CaCO_3
- b) Al(OH)_3
- c) Ca(OH)_2
- d) Mg(OH)_2

[View Answer](#)

Answer: c

Explanation: The molecular formula of lime is Ca(OH)_2 . It is a white caustic alkaline substance consisting of calcium oxide, which is obtained by heating limestone and which combines with water with the production of much heat.

2. What is the molecular formula of soda?

- a) Na_2CO_3
- b) $\text{Al}_2(\text{SO}_4)_3$
- c) Mg(OH)_2
- d) Ca(OH)_2

[View Answer](#)

Answer: a

Explanation: The molecular formula of soda is Na_2CO_3 . It is also called washing soda or soda ash.

3. Which of the following is not a precipitate in lime-soda process?

- a) CaCO_3
- b) Fe(OH)_3
- c) Al(OH)_3
- d) $\text{Al}_2(\text{SO}_4)_3$

[View Answer](#)

Answer: d

Explanation: $\text{Al}_2(\text{SO}_4)_3$ is not a precipitate in lime-soda process. All the other options are the precipitate in lime-soda process.

4. Which of the following is not used as a coagulant in lime-soda process?

- a) Alum
- b) Calcium bicarbonate
- c) Aluminium sulphate
- d) Sodium aluminate

[View Answer](#)

Answer: b

Explanation: Calcium bicarbonate is not used as a coagulant in lime-soda process. Alum, aluminium sulphate and sodium aluminate are used as coagulants in lime-soda process.

5. What is the function of coagulant?

- a) It helps in the formation of fine precipitate
- b) It helps in the formation of coarse precipitate
- c) It helps in increasing the solubility
- d) It helps in increasing the boiling point

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Answer: b

Explanation: Coagulants help in the formation of coarse precipitate. Coagulation is a process of addition of coagulant to destabilize a stabilized charged particle.

6. For the softening of one mole of magnesium bicarbonate, the number of mole of lime required is?

- a) 2

- b) 3
- c) 4
- d) 5

[View Answer](#)

Answer: a

Explanation: For the softening of one mole of magnesium bicarbonate, the number of mole of lime required is two. The ratio of bicarbonate to lime in lime-soda process is 1:2.

7. The residual hardness in lime-soda process is _____

- a) 0-2 ppm
- b) 5-15 ppm
- c) 15-50 ppm
- d) 50-70 ppm

[View Answer](#)

Answer: c

Explanation: The residual hardness in lime-soda process is 15-50 ppm. Lime soda softening cannot produce a water at completely free of hardness because of the low solubility of CaCO_3 and $\text{Mg}(\text{OH})_2$.

8. In lime soda process, capital cost is _____ whereas operational expenses are _____

- a) High, low
- b) High, high
- c) Low, low
- d) Low, high

[View Answer](#)

Answer: d

Explanation: In lime soda process, capital cost is low whereas operational expenses are high. It is because the chemicals and reagents used are costly.

9. In lime-soda process, no exchange of ions occurs.

- a) True

b) False

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Answer: a

Explanation: In lime-soda process, no exchange of ions occurs. Recarbonation is used to stabilize the water. The excess lime and magnesium hydroxide are stabilized by adding carbon dioxide, which also reduces the pH from 10.8 to 9.5.

10. Which of the following is the second step for calculating the amount of lime and soda?

- a) Identification of lime and soda for different salts
- b) Calculation of CaCO_3 equivalents
- c) Calculation of lime requirements
- d) Calculation of soda requirements

[View Answer](#)

Answer: b

Explanation: Calculation of CaCO_3 equivalents is the second step for calculating the amount of lime and soda. First step is to identify the lime and soda for different salts. and the last two steps are the calculation of lime and soda requirements.

This set of Engineering Chemistry Multiple Choice Questions & Answers (MCQs) focuses on "Zeolites".

1. The chemical formula of zeolite is _____

- a) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$
- b) $\text{Al}_2(\text{SO}_4)_3 \cdot 18 \text{H}_2\text{O}$
- c) $\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot x\text{SiO}_2 \cdot y\text{H}_2\text{O}$
- d) $\text{Na}_2\text{Al}_2\text{O}$

[View Answer](#)

Answer: c

Explanation: The chemical formula of zeolite is $\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot x\text{SiO}_2 \cdot y\text{H}_2\text{O}$. Zeolites are micro-porous, aluminosilicate minerals commonly used as commercial adsorbents and catalysts.

2. Which of the following is not naturally occurring zeolite?

- a) Na^+
- b) Al^{+3}
- c) Si^{+4}
- d) Ca^{+2}

[View Answer](#)

Answer: d

Explanation: Ca^{+2} is not naturally occurring zeolite. Na^+ , Al^{+3} and Si^{+4} are some of the naturally occurring zeolites.

3. Natural zeolites are _____

- a) Porous
- b) Amorphous
- c) Non-durable
- d) Possess gel structure

[View Answer](#)

Answer: b

Explanation: Natural zeolites are non-porous, amorphous and durable. Natural zeolites form where volcanic rocks and ash layers react with alkaline groundwater.

4. Synthetic zeolites possess a higher exchange capacity per unit weight compared to natural zeolites.

- a) True
- b) False

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Answer: a

Explanation: Synthetic zeolites possess a higher exchange capacity per unit weight compared to natural zeolites. Synthetic zeolites are formed by a process of slow crystallization of a silica-alumina gel in the presence of alkalis and organic templates.

5. The exhausted zeolite is reclaimed by treating the bed with a _____

- a) Conc. NaCl
- b) Conc. HCl
- c) Conc. H_2SO_4
- d) Dil. HCl

[View Answer](#)

Answer: a

Explanation: The exhausted zeolite is reclaimed by treating the bed with conc. NaCl (brine) solution. Zeolites have the potential of providing precise and specific separation of gases including the removal of H_2O , CO_2 and SO_2 from low-grade natural gas streams.

6. Select the incorrect statement from the following option.

- a) The capital cost for zeolite process is high
- b) The residual hardness in zeolite process is 0-15 ppm
- c) The raw water used should be turbid and acidic

d) Automation is possible in zeolite process

[View Answer](#)

Answer: c

Explanation: The raw water used should be non-turbid and non-acidic. All the other options are correct. The capital cost for zeolite process is high and the residual hardness in the zeolite process is 0-15 ppm. Automation is also possible in zeolite process.

7. In zeolite process, the exchange of _____ takes place.

- a) Anions
- b) Cations
- c) Both cations and anions
- d) No ions exchange

[View Answer](#)

Answer: b

Explanation: In the zeolite process, the exchange of only cations takes place. The specific activation modality of most zeolitic catalysts used in petrochemical applications involves quantum-chemical Lewis acid site reactions.

8. The hardness of 1000 litres of a water sample was removed by passing it through a zeolite softener which required 30litres of NaCl solution containing 1.5 gm/L NaCl for regeneration. The hardness of the water sample will be _____

- a) 54.2 ppm
- b) 12.9 ppm
- c) 45 ppm
- d) 38.46 ppm

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Answer: d

Explanation: The hardness of the water sample will be 38.46 ppm.

9. Which of the following cannot be used in place of NaCl?

- a) NaNO_3
- b) KCl
- c) HCl
- d) KNO_3

[View Answer](#)

Answer: c

Explanation: NaNO_3 , KCl and KNO_3 can also be used instead of NaCl. But HCl cannot be used in place of NaCl.

10. Natrolite is an example of _____

- a) Synthetic zeolite
- b) Natural zeolite
- c) Calgon
- d) Colloid

[View Answer](#)

Answer: b

Explanation: Natrolite is an example of natural zeolite. Natural zeolites are non-porous, amorphous and durable. Natural zeolites form where volcanic rocks and ash layers react with alkaline groundwater.

This set of Engineering Chemistry Quiz focuses on "Calgon Conditioning".

1. What is Calgon?

- a) Potassium hexa meta sulphate
- b) Magnesium hexa meta phosphate
- c) Sodium hexa meta phosphate
- d) Calcium hexa meta sulphate

[View Answer](#)

Answer: c

Explanation: Calgon is sodium hexa meta phosphate. Calgon prevents limescale build-up in washing machines all over the world to protect the heating element, pipes and drum of the machines.

2. Calgon is added to boiler water to prevent _____

- a) Foaming
- b) Sludge and scale formation
- c) Priming
- d) Corrosion

[View Answer](#)

Answer: b

Explanation: Calgon is added to boiler water to prevent sludge and scale formation. Calgon prevents limescale build-up in washing machines all over the world to protect the heating element, pipes and drum of the machines.

3. Calgon converts the scale forming impurity like CaSO_4 into _____

- a) Soluble complex compound
- b) Insoluble complex compound
- c) Soluble acids

d) Insoluble acids

[View Answer](#)

Answer: a

Explanation: Calgon converts the scale forming impurity like CaSO_4 into soluble complex compound which are harmless to boiler.

4. The quantity of calgon to be added to prevent scale and sludge formation is _____

a) 10-20 ppm

b) 30-50 ppm

c) 0.005-0.1 ppm

d) 0.5-5 ppm

[View Answer](#)

Answer: d

Explanation: The quantity of calgon to be added to prevent scale and sludge formation is 0.5-5 ppm. It is used in small quantity.

5. At high temperature and pressure, calgon is converted into sodium ortho-phosphate which reacts with _____ salts.

a) Magnesium

b) Calcium

c) Sodium

d) Potassium

[View Answer](#)

Answer: b

Explanation: At high temperature and pressure, calgon is converted into sodium orthophosphate which reacts with calcium salts to form calcium ortho-phosphate.

6. Calcium ortho-phosphate appears as loose sludge and thus can be removed by blow-down operation.

a) True

b) False

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Answer: a

Explanation: Calcium orthophosphate appears as loose sludge and thus can be removed by blow-down operation. It is formed by the reaction of sodium ortho-phosphate with calcium salts.

7. Calgon conditioning is not applicable for the prevention of _____

a) Iron oxide only

b) Copper depositions only

- c) Sulphurdioxide only
- d) Iron oxide and copper depositions

[View Answer](#)

Answer: d

Explanation: Calgon conditioning is not applicable to the prevention of iron oxide and copper depositions. Calgon prevents limescale build-up in washing machines all over the world to protect the heating element, pipes and drum of the machines.

8. Iron oxide and copper depositions can be prevented by adding _____ to the boiler water.

- a) Calgon
- b) Carbonate
- c) EDTA
- d) EBT

[View Answer](#)

Answer: c

Explanation: Iron oxide and copper depositions can be prevented by adding EDTA to the boiler water. Ethylenediaminetetraacetic acid (EDTA), is an amino polycarboxylic acid and a colorless and a water-soluble solid.

9. Carbonate conditioning is not done in high pressure boilers because it may lead to caustic embrittlement.

- a) True
- b) False

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Answer: a

Explanation: Carbonate conditioning is not done in high pressure boilers because it may lead to caustic embrittlement. Caustic embrittlement is the phenomenon in which the material of a boiler becomes brittle due to the accumulation of caustic substances.

10. Which of the following is not used in colloidal conditioning?

- a) Kerosene
- b) Tannin
- c) Agar-agar
- d) Vinegar

[View Answer](#)

Answer: d

Explanation: Kerosene, tannin and agar-agar are used in colloidal conditioning. Vinegar is not used for this purpose.

This set of Engineering Chemistry Multiple Choice Questions & Answers (MCQs) focuses on "Desalination of Brackish Water".

1. The example of brackish water is _____

- a) Ground water
- b) Rain water
- c) Sea water
- d) Underground water

[View Answer](#)

Answer: c

Explanation: The example of brackish water is sea water. Ground water, underground water and rain water are not brackish water. Sea water is also saline in nature and not fit for domestic purpose.

2. Which of the following technique is not used for the desalination of brackish water?

- a) Electrolysis
- b) Electrodialysis
- c) Reverse osmosis
- d) Distillation

[View Answer](#)

Answer: a

Explanation: Electrolysis technique is not used for the desalination of brackish water. Electrodialysis, reverse osmosis and distillation are the few techniques used for desalination of brackish water.

3. Salt cannot be separated from brackish water by freezing.

- a) True
- b) False

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Answer: b

Explanation: Salt can be separated from brackish water by freezing.

4. Electrodialysis is based on the fact that the ions present in saline water migrate towards their respective electrodes under the influence of applied _____

- a) Current
- b) Resistance
- c) Conductance

d) EMF

[View Answer](#)

Answer: d

Explanation: Electrodialysis is based on the fact that the ions present in saline water migrate towards their respective electrodes under the influence of applied emf. The potential difference generated between the electrodes is the main cause of flow of electrons.

5. The cation selective membrane is embedded with functional groups of _____

- a) Positive charge
- b) Negative charge
- c) Both positive as well as negative charge
- d) Neutral

[View Answer](#)

Answer: b

Explanation: The cation selective membrane is embedded with functional groups of negative charge as it attracts only positive charges towards them.

6. In electrodialysis cell, the pressure is about _____

- a) 2 kg/m²
- b) 3 kg/m²
- c) 5-6 kg/m²
- d) 10 kg/m²

[View Answer](#)

Answer: c

Explanation: Electrodialysis is an electrically driven separation conducted at very low pressure-driven of about 5-6 kg/m².

7. Electrodialysis is an electrically driven separation conducted at a very low pressure-driven, size-exclusion filtering process.

- a) True
- b) False

[View Answer](#)

Answer: a

Explanation: Electrodialysis is an electrically driven separation conducted at a very low pressure-driven, size-exclusion filtering process. Electrodialysis is used to transport salt ions from one solution through ion-exchange membranes to another solution under the influence of an applied electric potential difference.

8. The ion-exchange membrane are electrically conductive and are not permeable to _____ flow, even under pressure.

- a) Electron
- b) Oil
- c) Fluorine
- d) Water

[View Answer](#)

Answer: d

Explanation: The ion-exchange membrane are electrically conductive and impermeable to water flow, even under pressure. Electrons can easily flow through these membranes.

9. Select the incorrect statement from the following option.

- a) Electrodialysis reversal (EDR) was introduced in the commercial sector to improve electrodialysis process
- b) The EDR process and conventional ED unit operates on the same principle, except at intervals of several times an hour
- c) The reversal feature is useful in breaking up films, scales and other deposits
- d) Electrodialysis process is not economical as per capital cost

[View Answer](#)

Answer: d

Explanation: Electrodialysis process is economical as per capital cost and operational expenses are concerned. All the other options are correct.

10. Which one of the following is not a cation exchanger?

- a) Amberlite
- b) Triolite
- c) Dowex
- d) Duolite

[View Answer](#)

Answer: b

Explanation: Triolite is not a cation exchanger. Amberlite, dowex and duolite are some of the examples of the cation exchanger.

This set of Engineering Chemistry Multiple Choice Questions & Answers (MCQs) focuses on "Reverse Osmosis".

1. The basis of reverse osmosis is _____

- a) Osmotic pressure is greater than the hydrostatic pressure

- b) Osmotic pressure is equal to the hydrostatic pressure
- c) Hydrostatic pressure is greater than the osmotic pressure
- d) Osmotic pressure does not exist

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Answer: c

Explanation: The basis of reverse osmosis is that the hydrostatic pressure is greater than osmotic pressure. It is a process by which a solvent passes through a porous membrane in the direction opposite to that for natural osmosis when subjected to a hydrostatic pressure greater than the osmotic pressure.

2. Select the incorrect statement from the following option.

- a) Osmosis is the phenomenon by virtue of which flow of solvent takes place from low concentration to high concentration through a semi-permeable membrane
- b) The flow continues till the concentration is equal on both the sides
- c) The driving force of osmosis is osmotic pressure
- d) Osmosis is used for the treatment of waste water

[View Answer](#)

Answer: d

Explanation: Reverse osmosis is used for the treatment of waste water. All the other options are correct. Osmosis is the phenomenon by virtue of which flow of solvent takes place from low concentration to high concentration through a semi-permeable membrane.

3. Semi-permeable membrane is selective membrane which does not permit the passage of dissolved _____ particles.

- a) Solvent
- b) Solute
- c) Anhydrous
- d) Saturated

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Answer: b

Explanation: Semi-permeable membrane is selective membrane which does not permit the passage of dissolved solute particles. It is a type of biological or synthetic, polymeric membrane that will allow certain molecules or ions to pass through it by diffusion

4. Which of the following is not used for semi-permeable membrane?

- a) Polymethyl sulphate
- b) Cellulose acetate
- c) Polyamide polymer

d) Polymethyl acrylate

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Answer: a

Explanation: Polymethyl sulphate is not used for semi-permeable membrane. Cellulose acetate, polyamide polymer and polymethyl acrylate are used as semi-permeable membranes.

5. The pressure which is applied to separate the water from its contaminants is of the order _____

- a) 5-10 kg/cm²
- b) 15-40 kg/cm²
- c) 50-100 kg/cm²
- d) 100-150 kg/cm²

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Answer: b

Explanation: The pressure which is applied to separate the water from its contaminants is of the order 15-40 kg/cm². It does not require very high pressure.

6. The process of reverse osmosis is also known as _____

- a) Hyper-filtration
- b) Double-filtration
- c) Double-osmosis
- d) Hyper-osmosis

[View Answer](#)

Answer: a

Explanation: The process of reverse osmosis is also known as super- or hyper-filtration. It is a process by which a solvent passes through a porous membrane in the direction opposite to that for natural osmosis when subjected to a hydrostatic pressure greater than the osmotic pressure.

7. Which of the following is not an application of reverse osmosis?

- a) Desalination
- b) Reclamation of minerals
- c) For dialysis in hospitals
- d) For industrial use

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Answer: d

Explanation: Reverse osmosis is not used for industrial purpose. All the other options are correct. It is used for desalination, reclamation of minerals and for dialysis in hospitals.

8. Select the incorrect statement about reverse osmosis from the following option.

- a) It is simple and reliable process
- b) It is relatively energy efficient
- c) It operates at a comparatively high temperature
- d) The life of an SPM is about 2 years and it can be easily replaced within a few minutes

[View Answer](#)

Answer: c

Explanation: Reverse osmosis operates at a comparatively low temperature. All the other options are correct. It is simple and reliable process, relatively energy efficient. The life of an SPM is about 2 years and it can be easily replaced within a few minutes.

9. The pH for the potable water should be in the range of _____

- a) 5-6
- b) 7-8.5
- c) 9-10
- d) 12-13

[View Answer](#)

Answer: b

Explanation: The pH for the potable water should be in the range of 7-8.5. It should not be acidic and also should not have a high value of basicity. Hence, it's value should be in the neutral range.

10. The total hardness of the potable water should be less than _____

- a) 500 ppm
- b) 700 ppm
- c) 900 ppm
- d) 1000 ppm

[View Answer](#)

Answer: a

Explanation: The total hardness of the potable water should be less than 500 ppm. Water having hardness more than 500 ppm is not safe for consumption.