

MALLA REDDY ENGINEERING COLLEGE (Autonomous)

I B.Tech I Semester (MR15 Regulations) I Online Mid Examination

Subject: Applied Chemistry

Multiple choice Questions:

1. The purification of brackish water by reverse osmosis is also called as []
a. Electro-dialysis. b. Reverse osmosis d. Zeolite d. Ion exchange
2. One part of CaCO_3 equivalent hardness per 10^5 parts of water is also called as []
a. Degree Clarke b. ppm. c. Degree French d. Mg/L.
3. Boiler corrosion caused by using highly alkaline water in boiler is called []
a. Corrosion b. boiler corrosion c. caustic embrittlement d. erosion.
4. Caustic embrittlement can be avoided by using []
a. Sodium phosphate b. hydrogen c. ammonium hydroxide d. sodium sulphate.
5. Caustic embrittlement is a type of []
a. Boiler corrosion b. conditioning c. scale formation d. sludge formation.
6. The soft loose and slimy precipitate formed within the boiler is called []
a. Scale b. sludge. C. embrittlement d. coagulation.
7. Sodium meta aluminate used in internal treatment of boiler water produces flocculent precipitates of []
a. $\text{Mg}(\text{OH})_2$ & $\text{Al}(\text{OH})_3$ b. NaOH & $\text{Al}(\text{OH})_3$
c. $\text{Ca}(\text{OH})_2$ & $\text{Al}(\text{OH})_3$ d. $\text{Ca}(\text{OH})_2$ & $\text{Mg}(\text{OH})_2$
8. In low pressure boilers carbonate conditioning of boiler feed water carries out to remove []
a. Calcium bicarbonate b. calcium sulphate c. calcium chloride d. calcium nitrate.
9. The process of allowing water to stand undisturbed in big tanks for settling of the suspended particles due to force of gravity []
a. Coagulation. b. conditioning c. Sedimentation d. Screening
10. The composition of Alum is []
a. $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$ b. $\text{K}_2(\text{SO}_4)_3 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$
c. $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 20\text{H}_2\text{O}$ d. $\text{K}_2\text{SO}_4 \cdot \text{Al}_2\text{SO}_4 \cdot 24\text{H}_2\text{O}$
11. Temporary hardness in water is removed by []
a. Filtration b. sedimentation c. Boiling d. coagulation

12. Blow-down operation causes the removal of []
 a. Scales b. Sludges c. Acidity d. Sodium chloride
13. Solubility of calcium sulphate in water []
]
 a. Increases with rise of temperature. b. Decreases with rise of temperature.
 b. Remains unaltered with rise of temp. d. doesn't adopt any definite pattern with rise of temperature.
14. Permanent hardness of water can't be removed by Treatment with []
 a. lime soda. b. By permutite process. c. By boiling. d. By ion-exchange process.
15. Hard water is unfit for use in boilers for generating steam because []
 a. Its boiling point is higher b. steam is generated at high temperature.
 c. Water decomposes into O₂ and H₂. d. It produces scales inside the boiler.
16. Estimation of hardness of water by EDTA method is used to determine []
 a. Total hardness b. temporary hardness only.
 c. Permanent hardness only. d. All the above.
17. Hard water can be softened by passing it through []
 a. Lime stone b. Sodium hexa Meta phosphate. c. Ion-exchange resin. d. Sodium silicate.
18. Calgon is a trade name given to []
 a. Sodium silicate b. Sodium hexa meta phosphate.
 c. Sodium meta phosphate. d. Calcium phosphate.
19. Brackish water mostly contains dissolved []
 a. Calcium salts b. Magnesium salts. C. Turbidity d. Sodium chloride.
20. The method by which the ions are pulled out of salt water by direct current employed thin, rigid membrane air is called []
 a. Electro dialysis b. Reverse osmosis. c. Zeolite. d. DD. Ion exchange.
21. Tannins and agar-agar are used for []
 a. Phosphate conditioning. **B**.carbonate conditioning c. colloidal conditioning **d**. calgon conditioning.
22. The external treatment of boiler water feed done by []
 a. Lime-soda process b. sodium sulphate treatment c. calgon process d. sodium aluminate treatment.
23. The process of wet-steam formation is called []
 a. Foaming b. priming c. corrosion d. caustic embrittlement.
24. Mechanical steam purifiers avoid []
 a. Corrosion b. priming c. Scale formation d. sludge formation.
25. Castor oil is a []
 a. Anti-skinning agent b. antifoaming agent c. anti-ageing agent d. anti-corrosive agent

26. ferrous sulphate is commonly used in the treatment of municipal water for []
 a. Filtration b. flocculation c. sedimentation c. disinfection.
27. Liquid chlorine is most effective []
 a. Disinfectant b. coagulant c. flocculent d. sterilizing agent
28. Disinfection by ozone is due to liberation of []
 a. Oxygen b. nascent oxygen c. molecular oxygen d. none.
29. The formula of chloramine is []
 a. ClNH_2 b. NHCl_2 c. NCl_3 d. NH_2Cl_2
30. Phosphate conditioning of boiler feed is carried out by []
 a. Na_3PO_4 b. $\text{Ca}(\text{PO}_4)_2$ c. $\text{Mg}(\text{PO}_3)_2$ d. H_3PO_4
31. Hardness of water is caused by []
 a. CaCl_2 b. NaCl c. Na_2CO_3 d. K_2S
32. Hard water contains []
 a. Na^\oplus b. Mg^{2+} c. Ca^{2+} d. both (b) and (c)
33. Permanent hardness of water is due to []
 a. HCO_3^- b. CO_3^{2-} c. Cl^- d. Na^\oplus
34. Temporary hardness can be removed by []
 a. Zeolite process b. ion exchange. boiling d. none
35. The demineralisation of water is called []
 a. Zeolite process b. ion-exchange process c. lime-soda process d. none
36. Which is not the unit of hardness of water? []
 a. ppm b. epm c. degree Clark d. mg/L
37. The relation between mg/L and ppm is []
 a. 1 mg/L = 1 ppm b. 10 mg/L = 1 ppm c. 1 mg/L = 10 ppm d. 1 mg
38. In EDTA titration, the colour of the end point is []
 a. red b. blue c. yellow d. no change
39. Blow down operation causes the removal of []
 a. sludges b. scales c. NaCl d. acidity
40. Temporary hardness of water can be removed by []

a filtration b screening c boiling d sedimentation

41 Purest form of natural water is []
a sea water b river water c rain water d lake water

42 Calgon is a trade name given to []
a. sodium hexametaphosphate b. magnesium phosphate
c. calcium silicate d. sodium sulphate

43 The phenomenon of carrying of water along with impurities by steam is []
a priming b carry over c foaming d embrittlement

44 Brakish water mostly contains dissolved []
a KCl b $MgCl_2$ c $CaCl_2$ d NaCl

45 Water can be sterilized by using []
(a) Cl_2 (b) CCl_4 (c) $CaCO_3$ (d) NaOH

46 Brakish water can be purified by using []
a lime-soda process b permutit process c filtration d reverse osmosis method

47 Best method of removing hardness of water is []
a ion exchange b permutit c lime-soda d boiling

48 Hardness of water is expressed in terms of equivalents of []
a $MgCO_3$ b $CaCO_3$ c Na_2CO_3 d. K_2CO_3

49 Caustic embrittlement is caused due to the presence of []
a NaCl b NaOH c $MgCO_3$ d. KNO_3

50. Priming and foaming in boilers produce []
a wet steam b. dry steam c soft steam d. hard steam

51 The exhausted cation exchange resin can be regenerated by treating with []
a. dil. NaOH b. dil. HCl c distilled water d. dil. NaCl

52 A hard sticky precipitate formed on the inner surface of the boiler is called []
a. sludge b. embrittlement c. coating d. scale

ANSWERS

Multiple choice

1. a 2. c 3. c 4. d 5. a

| | | | | |
|-------|-------|-------|-------|-------|
| 6. b | 16.d | 26. b | 36. b | 46.d |
| 7. a | 17. c | 27. a | 37.a | 47.a |
| 8. b | 18. b | 28. b | 38.b | 48. b |
| 9. c | 19. d | 29. a | 39.a | 49.b |
| 10. a | 20. a | 30.a | 40. c | 50. a |
| 11. c | 21. c | 31. a | 41.c | 51. b |
| 12.b | 22. a | 32.d | 42.a | 52. d |
| 13. b | 23. b | 33.c | 43.a | |
| 14. c | 24. b | 34.c | 44.d | |
| 15. d | 25. b | 35.b | 45.a | |

Fill In the Blanks

1. Presence of residual _____ in boiler water causes caustic embrittlement.
2. _____ causes the flow of solvent from lower concentration to higher concentration, which is separated by a semi permeable membrane.
3. In Lime-soda process the addition of lime cannot remove _____ hardness of water.
4. In phosphate conditioning if the boiler feed water is too alkaline _____ is used for internal conditioning.
5. Priming and foaming in boilers produce _____ steam.
6. On addition of chlorine to water _____ acid is produced which is powerful germicide.
7. Hardness of water is due to the dissolved salts of _____ and _____.
8. The chemical which removes oxygen of water without adding hardness is _____.
9. Hardness of water is expressed in equivalents of _____.
10. In lime-soda process of softening, calcium and magnesium ions are precipitated as _____ and _____.
11. Sodium aluminate is used as _____ during purification of water.
12. Anion exchange resins are regenerated by using _____.
13. Best method of removing hardness of water is _____ process.
14. Among chloramine, bleaching powder and chlorine _____ is powerful disinfectant.
15. The hardness of water containing $MgSO_4$ (Mol. Wt. 120) with concentration 12 mg/l is _____.
16. Temporary hardness of water can be removed by _____.
17. Calgon treatment is used for removal of dissolved _____.
18. The chemical structure of Zeolite is _____.
19. Natrolite is a _____ zeolite.
20. Ion free water is known as _____.
21. The exhausted Zeolite is regenerated by _____.
22. _____ is a process of allowing water to stand undisturbed in big tanks.
23. Al_2SO_4 alum produces _____ as flocculent precipitates during softening of water.
24. _____ membranes are selected for efficient separation of ions.

25. The presence of even small amounts of MgCl_2 will cause _____ of boiler plate to large extent.
26. Cation exchange resin contains _____ mobile ions.
27. The hardness of sample of water is 10 ppm, which can be expressed as _____ $^\circ\text{Cl}$.
28. A sample of water contains 11.1 mg/l of CaCl_2 . Its hardness of CaCO_3 equivalents is _____.
29. _____ is used as indicator in the determination of hardness by EDTA method.
30. To maintain the pH between 9-10 during complex metric titration, estimation of hardness of water is _____.
31. indicator is used for the determination of hardness by EDTA method?
32. What is the pH of purest water is.....
33. Loose and slimy precipitate formed within the boiler is called.....
34. Temporary hardness of water is caused by the presence of.....
35. Permanent hardness of water is caused by the presence of.....
36. The common methods used for disinfection in waste water treatment plants are.....
37. chemical is sometime added in the process of coagulation and flocculation?
38. Permanent hardness of water may be removed by the addition of... Chemical
39. Chemical added for removal of Temporary hardness of water
40. The maximum desirable limit (BIS) of mercury in the drinking water is....
41. The purest form of naturally occurring water is.....
42. BOD stands for.....
43. The maximum desirable limit (BIS) of total hardness (as CaCO_3) in drinking water is....
44. The maximum permissible limit (BIS) of turbidity in drinking water is....
45. What is the color of weak metal complex in hardness of water by EDTA.....
46. A good amount of dissolved oxygen in water at room temperature & pressure is about....
47. The chemical formula for calgon is....
48. The process of killing of pathogenic bacteria is called.....
49. The full name of EDTA.....
50. Soft water give with soap.
51. The common units are used for expressing hardness of water.....
52. Write the structure of the EDTA (disodium salts).....
53. What is the stable complex colour in EDTA titration.....
54. What is the PH maintained in determination of hardness of water by EDTA method.....
55. In lime soda process soluble calcium & magnesium salts are converted to
56. For the removal of calcium & magnesium bicarbonates is required
57. According to BIS the maximum permissible limit of dissolved solids in drinking water is.....
58. Calgon is used for removal of.....

Answers:

1. NaOH or caustic soda
2. Osmosis
3. Calcium permanent salts
4. Sodium dihydrogen phosphate

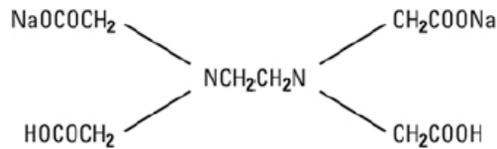
5. Wet
6. Hypochlorous
7. Calcium and magnesium
8. Hydrazine
9. Calcium carbonates
10. CaCO_3 and Mg(OH)_2
11. Coagulant
12. Sodium hydroxide
13. Ion exchange process
14. Chlorine
15. 10 mg/l
16. Boiling
17. CaSO_4
18. $\text{Na}_2\text{O Al}_2\text{O}_3 \cdot x\text{SiO}_2 \cdot y\text{H}_2\text{O}$
19. natural
20. demineralised water
21. NaCl solution
22. Sedimentation
23. Al(OH)_3
24. Ion-selective
25. Corrosion
26. H^+
27. 0.7°Cl
28. 10 mg/l
29. Erichrome black T
30. NH_4Cl & NH_4OH
31. EBT
32. 7 P^{H}
33. Sludge
34. $\text{Mg (HCO}_3)_2$
35. MgCl_2 & CaCl_2
36. Chlorination & Ozonisation
37. Aluminium Sulphate
38. Soda Ash
39. Ca (OH)_2
40. 0.001 mg/Lit
41. Rain Water
42. Bio chemical Oxygen Demand
43. 300ppm
44. 10NTU
45. Wine red Color
46. 8mg/lit
47. $\text{Na}_2[\text{Na}_4(\text{PO}_3)_6]$
48. Sterilization

49. Ethylene diamine tetra acetic acid

50. Lather

51. ppm or mg/lit

52.



53. Colourless

54. 9-10 pH

55. $CaCO_3$ & $Mg(OH)_2$

56. only lime

57. 2000mg/Lit

58. Permanent hardness of water

Indicate True or False for the Following:

1. Rain water is the purest form of natural water [T / F]
2. Suspended impurities are present in natural water [T / F]
3. Dissolved oxygen do not cause corrosion to boiler plate [T / F]
4. Calcium and magnesium salts in water are removed by lime-soda process. [T / F]
5. It is possible to remove permanent hardness of water by boiling. [T / F]
6. Chloramine2 is better than chlorine for sterilization. [T / F]
7. The common unit to express hardness of water is ppm. [T / F]
8. Sludge is a soft, loose, slimy precipitate formed inside the boiler [T / F]
9. NH_4Cl and NH_4OH buffer is used to maintain pH 4. [T / F]
10. Water softened by zeolite process causes caustic embrittlement. [T / F]
11. Hardness of water is expressed in calcium chloride equivalents. [T / F]
12. Hot lime-soda process is better than cold lime-soda process. [T / F]
13. The presence of CO_2 in water produces carbonic acid. [T / F]
14. The process of removing hardness producing salts is called softening. [T / F]
15. Hydrated sodium aluminium silicate is called zeolite. [T / F]
16. The process of removing common salt from water is called sailination. [T / F]
17. Addition of calgon to boiler water prevents calcium sulphate scale formation.[T / F]
18. Hard water precipitates soap as calcium soap. [T / F]
19. Reverse osmosis removes all ionic, non-ionic and colloidal impurities from water. [T/F]
20. Dissolved calcium bicarbonate in water causes permanent hardness. [T / F]
21. pH of acidic water is more than 7. [T / F]
22. Hard water softened by EDTA method. [T / F]
23. Break point chlorination gives the exact amount of chlorine to be added to raw water.[T/F]
24. Extra pure water is obtained by electro dialysis. [T / F]
25. The exhausted cation-exchanger can be regenerated by dil.NaOH [T / F]

26. Coagulant helps in setting of colloidal particles only. [T / F]
 27. A permeable membrane allows the flow of solvent molecules. [T / F]
 28. Calgon is a trade name of sodium hexa meta phosphate. [T / F]
 29. Calgon conditioning is better than phosphate conditioning. [T / F]
 30. Water is softened before using in boilers by external treatment. [T / F]

Answers

1.T 2.T 3.F 4.F 5.F 6.F 7.T 8.T 9.F 10.F 11.F 12.T 13.T 14.T 15.T 16.F 17.T 18.T 19.T 20.F 21.F
 22.F 23.T 24 T 25.F 26.T 27.T 28.T 29.T 30.T

MATCH OF THE FOLLWING

SET – I

- | | |
|--------------|---|
| (i) Soap | (a) $\text{Ca}(\text{OH})_2$ |
| (ii) Lime | (b) $\text{Na}_2[\text{Na}_4(\text{PO}_3)_6]$ |
| (iii) Calgon | (c) $\text{C}_{17}\text{H}_{35}\text{COONa}$ |

SET -II

- | | |
|-----------------------|------------------------------|
| (i) Soda | (a) NaCl |
| (ii) Sodium Phosphate | (b) Na_2CO_3 |
| (iii) Brackish water | (c) Na_3PO_4 |

SET -III

- | | |
|--------------|--|
| (i) EDTA | (a) Eriochrome Black Tea |
| (ii) EBT | (b) Ammonia Chloride & Hydroxide |
| (iii) Buffer | (c) Ethylene diamine tetra Acetic acid |

SET -IV

- | | |
|---------------------|----------------------------|
| (i) Priming | (a) Cellulose acetate |
| (ii) Semi permeable | (b) Stable bubblesmembrane |
| (iii) Foaming | (c) Wet Steam |

SET -V

- | | |
|-------------------------|----------------------------|
| (i) Temporary Hardness | (a) Sodium Hydroxide |
| (ii) Permanent Hardness | (b) Bicarbonates |
| (iii) Caustic Soda | (c) Chlorides & Sulphaides |

SET -VI

- | | |
|-----------------------------|-------------------------|
| (i) Physical Impurities | (a) Dissolved Salts |
| (ii) Chemical Impurities | (b) Microorganisms |
| (iii) Biological Impurities | (c) Suspended Particles |

SET -VII

- | | |
|------------------------|----------------------|
| (i) Ozonization | (a) Cl_2 |
| (ii) Chlorination | (b) CaOCl_2 |
| (iii) Bleaching Powder | (c) O_3 |

SET -VIII

- | | | |
|-------|------------------------|---------------|
| (i) | Cold Lime Soda Process | (a) 2 ppm |
| (ii) | Ion Exchange Process | (b) 50-60 ppm |
| (iii) | Hot Lime Soda Process | (c) 15 ppm |

Answers

SET-I

- (i) (c) (ii)(a) (iii) (b)

SET-II

- (i) (b) (ii)(c) (iii) (a)

SET-III

- (i) (c) (ii)(a) (iii) (b)

SET-IV

- (i) (c) (ii)(a) (iii) (b)

SET-V

- (i) (b) (ii)(c) (iii) (a)

SET-VI

- (i) (c) (ii)(a) (iii) (b)

SET-VII

- (i) (c) (ii)(a) (iii) (b)

SET-VIII

- (i) (b) (ii)(a) (iii) (c)

One Word Answer Questions:

1. Give any one unit for hardness of water
2. Expand EDTA.
3. Caustic embrittlement is due to which residual precipitate?
4. What is ion free water known as?
5. What is the chemical formula for lime?
6. What are sludge producing slats?
7. What is the purest form of natural water?
8. Write any one antifoaming agent?
9. What is the chemical formula for calgon?
10. What are the salts present in brackish water?
11. How temporary hardness of water can be removed?
12. What is the formula for chloramines?
13. What is the indicator used in determination of hardness of water by EDTA method?
14. The disinfection by chlorination is due to which acid?
15. What is formula of bleaching powder?
16. What is the dip in the graph of chlorination known as?
17. What is the process to remove over chlorination?
18. In reverse-osmosis mention the direction of solvent movement.
19. The flow of solvent from dilute to concentrated solution is called?
20. Agent which is useful to regenerate cation exchanger.

21. Agent which is useful to regenerate anion exchanger.
22. Gases which can be absorbed by deionised water
23. Temperature maintained in Hot lime-soda Process
24. Hardness of residual water hot lime soda process
25. Hardness of residual in cold lime soda process
26. Which salts cannot be treated by lime or soda in water?
27. Which Ca salts will not react with lime?
28. Which process is suitable for removal of sludge?
29. Which precipitation makes boiler water caustic.
30. Which softening agent causes caustic embrittlement

||

Answers

- | | |
|--|--|
| 1.ppm | 16.Break point Chlorination |
| 2.Ethylene diammine tetra acetic acid | 17.dechlorination |
| 3.Na ₂ CO ₃ | 18.High concentration to low concentration |
| 4.Deionised water | 19. Osmosis |
| 5.Ca(OH) ₂ | 20. Dil HCl |
| 6.MgCO ₃ ,MgCl ₂ ,CaCl ₂ or MgSO ₄ | 21. Dil NaOH |
| 7.Rain water | 22. CO ₂ & O ₂ |
| 8. Tannic acid | 23.80-150°C |
| 9.Na ₂ (Na ₄ PO ₃) ₆ | 24.15ppm |
| 10.NaCl | 25.30-60ppm |
| 11.Boiling | 26.NaCl,KCl |
| 12.CINH ₂ | 27. CaCl ₂ ,CaSO ₄ |
| 13.EBT | 28. Blow down operation |
| 14.HOCl | 29.NaOH |
| 15. CaOCl ₂ | 30.Na ₂ CO ₃ |