Uka Tarsadia University (Diwaliba Polytechnic)
Diploma in Chemical Engineering
Objective Type Questions (Basic Chemistry)

UNIT: - 1 CHEMICAL BONDING AND CATALYSIS

1. C-O bond length is minimum in
a. CO_2
b. CO_3^{2-}
c. $HCOO^-$
d. CO

2. Molecules are held together in a crystal by
a. hydrogen bond
b. electrostatic attraction
c. Van der Waal's attraction
d. dipole-dipole attraction

3. Sp^3d^2 hybridization is present in $[Co(NH_3)_6^{3+}]$, find its geometry
a. a. octahedral geometry
b. square planar geometry
c. tetragonal geometry
d. tetrahedral geometry

4. Find the molecule with the maximum dipole moment
a. CH_4
b. NH_3
c. CO_2
d. NF_3

5. MX_6 is a molecule with octahedral geometry. How many X – M – X bonds are at 180°?
a. four
b. two
c. three
d. six

6. Find the pair with sp2 hybridisation of the central molecule
a. NH_3 and NO_2^-
b. BF_3 and NH_2^-
c. BF_3 and NO_2^-
d. NH_2^- and H_2O

7. The formal charge and P-O bond order in PO43- respectively are
a. 0.6, -0.75
b. b. -0.75, 1.25

c. 1.0, -0.75
d. 1.25, -3

8. Which of the molecules does not have a permanent dipole moment?
a. SO_3
b. SO_2
c. H_2S
d. CS_2

9. p π– dπ bonding is present in which molecule
a. SO_3^{2-}
b. CO_3^{2-}
c. NO^{3-}
d. BO_3^{3-}

10. Which one has a pyramidal shape?
a. SO_3
b. PCl_3
c. CO_3^{2-}
d. NO_3^{-}

11. Which among the following chemical bond were described by Kossel and Lewis?
a. Metallic bond
b. Polar covalent bond
c. Coordinate bond
d. Ionic and Covalent bond

12. Which among the following is not a property of Ionic bond?
a. Losing of electrons
b. Gain of electrons
c. Sharing of electrons
d. Transfer of electrons

13. Which among the following formation is not an example of Covalent bond?
a. LiF
b. NH_3
c. CF_4
d. HF

14. State whether the given statement is true or false "Ionic bonds are non-directional".
a. True
b. False

15. If a bond is made up of a large number of organic compound, then the bond is termed as?
a. Ionic bond
b. Metallic bond

c. Covalent bond
d. Dipolar bond

16. Which among the following is not an example of hydrogen bond?
a. H_20
b. Liquid HCl
c. NH_3
d. $CHCl_3$

17. Atoms undergo bonding in order to _____
a. Attain stability
b. Lose stability
c. Move freely
d. Increase energy

18. An atom differs from its ion in which among the following?
a. Mass number
b. Atomic number
c. Neutrons
d. Number of proton

19. Which among the following is NOT both a molecule and a compound?
a. $C_6\ H_{12}\ O_6$
b. H_2O
c. CO_2
d. NaCl

20. Bond energy and the corresponding bond length vary directly with each other.
a. True
b. False

21. Electrovalent compounds are
a. low melting
b. insoluble in polar solvents
c. conductors in the fused state
d. none of the above

22. Ionic compounds don't conduct electricity in
a. solution
b. fused state
c. solid state
d. none of the above

23. When an element of very low ionization potential reacts with an element of very high electron affinity
a. a covalent bond is formed

b. an electrovalent bond is formed
c. a metallic bond is formed
d. no bond is formed

24. The bond between two atoms of the same element is
a. polar covalent bond
b. ionic bond
c. non-polar covalent bond
d. none of the above

25. The percentage of ionic character of a bond is calculated by the difference in
a. size of atoms
b. ionization potential of atoms
c. electronegativity of atoms
d. atomic volumes of atoms

26. In which of the following C-C bond length is least?
a. benzene
b. diamond
c. ethylene
d. acetylene

27. The paramagnetic nature of oxygen molecule is explained by
a. Valence bond theory
b. Heitler London theory
c. Hund Mulliken theory
d. none of the above

28. The bonds present in $CuSO_4.5H_2O$ are
a. electrovalent and coordinate
b. covalent and coordinate
c. electrovalent and covalent
d. electrovalent, covalent and coordinate

29. An element having 4 electrons in its outermost orbit forms bond by
a. losing electrons
b. gaining electrons
c. sharing electrons
d. any of the above

30. Elements with electronegativities 1.2 and 3.0 form
a. electrovalent bond
b. covalent bond
c. coordinate bond
d. metallic bond

31. The atomic number of four elements P, Q, R, S are 6, 8, 10 and 12 respectively. The two elements which can react to form ionic compounds are:

a. P and S
b. Q and R
c. P and R
d. Q and S

32. Which of the following statement is true about ionic compounds?

a. Ionic compounds conduct electricity when dissolved in water.
b. Ionic compounds are not soluble in water.
c. Ionic compounds are crystalline solids.
d. Only A and C

33. The solution of one of the following compounds will conduct electricity. This compound is:

a. CCl_4
b. HCl
c. $CaCl_2$
d. CH_3Cl

34. Which of the following property is not of ionic compound?

a. Solubility in water
b. High melting and boiling points
c. Electrical conductivity in solid state
d. Electrical conductivity in molten state

35. Which of the following compounds is not ionic in nature?

a. Lithium Chloride
b. Ammonium Chloride
c. Calcium Chloride
d. Carbon tetrachloride

36. Ionic compound are soluble in:

a. Ether
b. Alcohol
c. Kerosene
d. Water

37. What is an ionic bond?

a. Ionic bond is formed by sharing of electrons between two atoms.
b. It is a bond formed by the transfer of electrons from one atom to another.
c. Both A and B are correct
d. None of the above

38. Name the ions present in Sodium Oxide compound?

a. Sodium ions
b. Oxide ions
c. Both A and B
d. Neither A nor B

39. Which of the following are electrovalent compounds?

a. Copper Sulphate
b. Calcium Nitrate
c. Magnesium Oxide
d. All of the above

40. What is the electronic configuration of calcium ion (Ca^{2+})

a. 2,8
b. 2,8,2
c. 2,8,4
d. 2,8,8

41. The octet rule is not valid for the molecule

a. CO_2
b. H_2O
c. O_2
d. CO

42. The nature of bonding in CCl_4 and CaH_2 is

a. electrovalent in both CCl_4 and CaH_2
b. covalent in $CCl_4$and electrovalent in CaH_2
c. electrovalent in CCl_4 and covalent in CaH_2
d. covalent in both CCl_4 and CaH_2

43. CCl_4 is insoluble in water because

a. $CCl_4$is nonpolar and water is polar
b. water is nonpolar CCl_4 is polar
c. water CCl_4 are both polar
d. none

44. Which is not an exception to octet rule?

a. BF_3
b. $SnCl_4$
c. BeI_2
d. ClO_2

45. The compound with the lowest melting point is

a. AlF_3
b. $AlCl_3$
c. $AlBr_3$
d. AlI_3

46. A solid substance is soft, has a low melting point and is a poor conductor of electricity. The substance is most likely

a. an ionic solid

b. network solid
c. a metallic solid
d. a molecular solid

47. By applying a Silver Nitrate solution to pure carbon tetrachloride
a. a white precipitate soluble in ammonia is obtained
b. a curdy precipitate insoluble in ammonia is obtained
c. a pale yellow precipitate is obtained
d. no precipitate is obtained

48. The rate of reaction of organic compounds is slow due to
a. ionic bonding
b. amphoteric nature
c. covalent bonding
d. coordinate covalent bonding

49. The self linking ability of carbon is called
a. catenation
b. sublimation
c. hydrogenation
d. carbonation

50. Almost 95% of compounds are of carbon because they can form
a. single bonds
b. double bonds
c. triple bonds
d. multiple bonds

UNIT :- 2 CONCEPTS OF ELECTROCHEMISTRY AND CORROSION

1. The charge required for the reduction of 1 mol of MnO_4^- to MnO_2 is
a. 1 F
b. 3 F
c. 5 F
d. 6 F

2. The cell reaction of the galvanic cell.

$Cu(s) / Cu^{2+}(aq) // Hg^{2+}(aq) / Hg(l)$ is

(*a*) $Hg + Cu^{2+} \longrightarrow Hg^{2+} + Cu$
(*b*) $Hg + Cu^{2+} \longrightarrow Cu^{+} + Hg^{+}$
(*c*) $Cu + Hg \longrightarrow CuHg$
(*d*) $Cu + Hg^{2+} \longrightarrow Cu^{2+} + Hg$

3. Which of the following reaction is used to make fuel cell?

(*a*) $Cd\ (s) + 2Ni(OH)_3\ (s) \longrightarrow CuO\ (s) + 2\ Ni(OH)_2\ (s) + H_2O\ (l)$

(*b*) $Pb\ (s) + PbO_2\ (s) + 2H_2SO_4\ (aq) \longrightarrow 2PbSO_4\ (s) + 2H_2O\ (l)$

(*c*) $2H_2\ (g) + O_2\ (g) \longrightarrow 2H_2O\ (l)$

(*d*) $2Fe\ (s) + O_2\ (g) + 4H^+\ (aq) \longrightarrow 2Fe^{2+}\ (aq) + 2H_2O\ (l)$

4. If limiting molar conductivity of Ca^{2+} and Cl^- are 119.0 and 76.3 S cm2 mol-1, then the value of limiting molar conductivity of CaCl2 will be

a. 195.3 S cm2 mol-1
b. 271.6 S cm2 mol-1
c. 43.3 S cm2 mol-1
d. 314.3 S cm2 mol-1.

5. $NH_4NC>3$ is used in salt bridge because

a. it forms a jelly like material with agar-agar.
b. it is a weak electrolyte.
c. it is a good conductor of electricity.
d. the transport number of NH4+ and NO3– ions are almost equal.

6.

$$Cr_2O_7^{2-} + X \xrightarrow{H^+} Cr^{3+} + H_2O + \text{Oxidised product of X}$$

X in the above reaction cannot be

(*a*) $Cr_2O_4^{2-}$ (*b*) Fe^{2+}

(*c*) SO_4^{2-} (*d*) S^{2-}

7. The reaction, $3ClO^-\ (aq) \rightarrow ClO_3\ (aq) + 2Cl^-\ (aq)$ is an example of

a. Oxidation reaction
b. Reduction reaction
c. Disproportionation reaction
d. Decomposition reaction

8. The emf of the cell:

Ni / Ni^{2+} (1.0 M) // Au3+ (1.0 M) / Au ($E° = -0.25$ V for Ni^{2+}/Ni; $E° = 1.5$ V for Au^{3+}/Au) is

a. 1.25 V
b. -1.25 V
c. 1.75 V
d. 2.0 V

9. The standard emf of a galvanic cell involving cell reaction with n = 2 is formed to be 0.295 V at 25° C. The equilibrium constant of the reaction would be

a. 1.0 × 1010
b. 2.0 × 1011
c. 4.0 × 1012
d. 1.0 × 102

[Given F = 96500 (mol-1); R = 8.314 JK-1 mol-1]

10. If $E°Fe^{2+/}Fe$ = -0.441 V and $E°Fe^{2+/}Fe$ = 0.771 V, the standard EMF of the reaction,

$Fe + 2Fe^{3+} \rightarrow 3Fe2+$ will be

a. 1.212 V
b. 0.111 V
c. 0.330 V
d. 1.653 V

11. Oxygen has a +2 oxidation state in

a. H_2O
b. H_2O_2
c. F_2O
d. SO_2

12. Which of the following is the strongest reducing agent?

a. Li
b. Na
c. Mg
d. Ca

13. When the salt bridge is removed from a cell, its voltage

a. will increase
b. will decrease to half
c. will decrease to zero
d. will not change

14. When a dilute solution of H2SO4 is electrolysed using a platinum electrode, at anode the gas evolved is

a. SO_3
b. SO_2
c. H_2
d. O_2

15. The oxidation number of sulphur in Caro's acid is

a. +4

b. +5
c. +6
d. +8

16. Which of the following is the most powerful reducing agent?
a. H_2S
b. H_2SO_3
c. $SnCl_2$
d. HNO_2

17. Which of the following substances can act as both oxidising and reducing agent?
a. $KMnO_4$
b. $K_2Cr_2O_7$
c. HNO_3
d. H_2O_2

18. Electrolytes conduct electric current
a. by the movement of ions
b. by the movement of atoms
c. by the movement of molecules
d. by the movement of electrons from the cathode to anode

19. The reductant may be defined as a substance, whose oxidation no of the atom
a. increases
b. decreases
c. remains constant
d. may increases or decreases

20. Which of the following is not an example of an oxidizing agent?
a. hydrogen peroxide
b. potassium dichromate
c. nitric acid
d. hydrogen sulphide

21. The conductance in electrolyte conductors is due to
a. Either movement of electrons or ions
b. The flow of free mobile electrons
c. Movement of ions
d. None of the above

22. The cell constant of a conductivity cell
a. Changes with a change of concentration of electrolyte
b. Remains constant for a cell
c. changes with a change of electrolyte
d. changes with change in temperature

23. In electrolytic conductors, the conductance is due to _____

a. Flow of free mobile electrons
b. Movement of ions
c. Either movement of electrons or ions
d. Cannot be said

24. Which of the following is the example of the electrolytes?

a. Acids
b. Metals
c. Alloys
d. Oxides

25. The resistance of the conductor in the electrolytic cell _____ with an increase in temperature.

a. Increase
b. Decrease
c. Slightly increase
d. Do no change

26. The process of decomposition of an electrolyte by passing electric current through its solution is called as _____

a. Electrolyte
b. Electrode
c. Electrolysis
d. Electrochemical cell

27. Specific conductance is expressed in terms of _____

a. Ohm/cm
b. Ohm.cm
c. Ohm^{-1} cm^{-1}
d. Ohm^{-1} cm

28. The specific conductance of the electrolyte _____ on dilution.

a. Increases
b. Decrease
c. Slightly increases
d. Cannot be determined

29. Which of the following are the strong electrolytes?

a. HCL
b. Acetic acid
c. Propinoic acid
d. H_2SO_3

30. Which of the following is the weak base electrolyte?

a. NaOH

b. KOH
c. $Ca(OH)_2$
d. Alkyl amines

31. Mercuric chloride is a strong electrolyte.
a. True
b. False

32. The degree of ionisation is given by_____
a. $\alpha = \lambda v * \lambda\alpha$
b. $\alpha = \lambda v / \lambda\alpha$
c. $\alpha = \lambda v - \lambda\alpha$
d. $\alpha = \lambda v + \lambda\alpha$

33. In electrolyte, ionisation _____ on dilution.
a. Increases
b. Decreases
c. Becomes very small
d. Do not change

34. To detect the flow of current a head telephone ear piece is used instead of _____
a. Ammeter
b. Galvanometer
c. Multimeter
d. Voltmeter

35. The electrolyte is placed in a special type of cell known as _____
a. Conductivity cell
b. Conductance cell
c. Equivalent cell
d. Conduction cell

36. An electrolytic cell uses electrical energy to drive
a. chemical reaction
b. physical reaction
c. no reaction
d. biochemical reaction

37. In a dry cell, the anode is made up of
a. zinc
b. calcium
c. sodium
d. graphite

38. An electrochemical cell is also called
a. battery cell

b. galvanic cell
c. cell
d. chargeable cell

39. Electrochemical cells convert which of these into electrical energy?
a. mechanical energy
b. potential energy
c. kinetic energy
d. chemical energy

40. The electrolyte among the following is

a. NaOH
b. urea
c. glucose
d. benzene

41. Dry corrosion is also called as _____
a. Chemical corrosion
b. Electrochemical corrosion
c. Wet corrosion
d. Oxidation corrosion

42. Anhydrous inorganic liquid metal surface in absence of moisture undergoes _____
a. Wet corrosion
b. Dry corrosion
c. Galvanic corrosion
d. Pitting corrosion

43. The rusting iron is the _____
a. Oxidation corrosion
b. Liquid metal corrosion
c. Wet corrosion
d. Corrosion by other gases

44. Chemical action of flowing liquid metal at high temperatures is _____
a. Liquid metal corrosion
b. Corrosion by other gases
c. Oxidation corrosion
d. Wet corrosion

45. Corrosion between the dissimilar metals is called as _____
a. Galvanic corrosion
b. Dry corrosion
c. Oxidation corrosion
d. Concentration cell corrosion

46. Wet corrosion is also called as _____
a. Chemical cell
b. Electro chemical cell
c. Oxidation reaction
d. Liquid metal corrosion

47. Corrosion due to the corrosiveness of the soil is called as _____
a. Soil corrosion
b. Oxidation corrosion
c. Galvanic corrosion
d. Concentration cell corrosion

48. Corrosion due to the formation of cavities around the metal is called as the _____
a. Pitting corrosion
b. Soil corrosion
c. Water line corrosion
d. Galvanic corrosion

49. Corrosion due to the flow of the _____ between the cathodic and anodic areas is called as the electro chemical corrosion by evolution of hydrogen ad absorption of oxygen.
a. Electron current
b. Proton current
c. Ion current
d. Neutron current

50. Corrosion due to difference in water level is _____
a. Soil corrosion
b. Oxidation corrosion
c. Pitting corrosion
d. Water line corrosion

CORROSION OF METALS AND ITS PREVENTION

1. Which of the following methods is not used for the prevention of corrosion?
a. greasing
b. painting
c. plating
d. Heating

2. Widening of a river valley takes place due to
a. corrosion
b. lateral erosion
c. corrasion

d. hydraulic action

3. Elements which have properties of metals and nonmetals are
a. amorphous
b. crystalline
c. metalloids
d. metals

4. Corrosion can be prevented by
a. alloying
b. tinning
c. galvanizing
d. all of the above

5. Galvanic cells are also named as
a. electrolytic cells
b. battery cells
c. daniel cells
d. john cells

6. Voltaic cells generate electricity by
a. spontaneous redox reaction
b. non spontaneous redox reaction
c. sublimation reaction
d. thermochemical reaction

7. Galvanization is a method to
a. protect the iron metal from corrosion
b. extract iron from its ore
c. protect food from rancidity
d. improve the ductility property of the metal

8. Rusting of iron could take place in
a. distilled water
b. ordinary water
c. distilled and ordinary water
d. none of the above

9. Which of the following non-metals is liquid at the room temperature?
a. iodine
b. bromine
c. carbon
d. sulphur

10. During roasting which of the following poisonous gas is mainly produced
a. CO

b. CO_2
c. SO_2
d. N_2O

11. Corrosion of metals involves
a. Physical reactions
b. Chemical reactions
c. Both
d. None

12. The following factors play vital role in corrosion process
a. Temperature
b. Solute concentration
c. Both
d. NONE

13. Following equation is related to corrosion rate
a. Nernst equation
b. Faraday's equation
c. Either
d. Neither

14. Passivity is due to
a. Higher EMF
b. Lower EMF
c. Oxide film
d. All

15. Passivity is not reason for inertness of the following
a. Au
b. Al
c. Ti
d. Ni

16. Difficult to monitor and very dangerous form of corrosion
a. Galvanic
b. Pitting
c. Crevice
d. Stress

17. This form of corrosion occurs due to concentration difference in a component
a. Uniform
b. Galvanic
c. Inter-granular
d. Stress

18. Main form of ceramic degradation
a. Corrosion
b. Weathering
c. Dissolution
d. Swelling

19. The following influences deterioration of polymers
a. Weather
b. Radiation
c. Temparature
d. All

20. Following is not the main form of polymer deterioration
a. Corrosion
b. Swelling and Dissolution
c. Weathering
d. Scission

21. When Pt and Co are electrically connected, which one gets corroded
a. Pt
b. Co
c. None
d. Can't decide

22. Which of the following can be used for cathodic protection:
a. Al
b. Cd
c. Cu
d. Either

23. Dry corrosion is also called as _____
a. Chemical corrosion
b. Electrochemical corrosion
c. Wet corrosion
d. Oxidation corrosion

24. Anhydrous inorganic liquid metal surface in absence of moisture undergoes _____
a. Wet corrosion
b. Dry corrosion
c. Galvanic corrosion
d. Pitting corrosion

25. The rusting iron is the _____
a. Oxidation corrosion
b. Liquid metal corrosion
c. Wet corrosion

d. Corrosion by other gases

26. Chemical action of flowing liquid metal at high temperatures is _____
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d. Concentration cell corrosion

28. Wet corrosion is also called as _____
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b. Electro chemical cell
c. Oxidation reaction
d. Liquid metal corrosion

29. Corrosion due to the corrosiveness of the soil is called as _____
a. Soil corrosion
b. Oxidation corrosion
c. Galvanic corrosion
d. Concentration cell corrosion

30. Corrosion due to the formation of cavities around the metal is called as the _____
a. Pitting corrosion
b. Soil corrosion
c. Water line corrosion
d. Galvanic corrosion

31. Corrosion due to the flow of the _____ between the cathodic and anodic areas is called as the electro chemical corrosion by evolution of hydrogen ad absorption of oxygen.
a. Electron current
b. Proton current
c. Ion current
d. Neutron current

32. Corrosion due to difference in water level is _____
a. Soil corrosion
b. Oxidation corrosion
c. Pitting corrosion
d. Water line corrosion

33. Which of the following comes under the wet corrosion?

a. Concentration cell corrosion
b. Oxidation corrosion
c. Liquid metal corrosion
d. Corrosion by other gases

34. Corrosion is uniform in _____
a. Dry corrosion
b. Wet corrosion
c. Pitting corrosion
d. Water line corrosion

35. Corrosion along the grain boundaries is called as _____
a. Stress corrosion
b. Inter granular corrosion
c. Water line corrosion
d. Pitting corrosion

36. Dry corrosion takes place in _____
a. Homogeneous solutions
b. Heterogeneous solutions
c. Neither homogeneous nor heterogeneous

d. Both homogeneous and heterogeneous solutions

37. Lower is PH , corrosion is,
a. Greater
b. Lower
c. Constant
d. None of above

38. _____reduces the moisture content of air
a. Dehumidification
b. Modification of environment
c. Inhibitors
d. Hot dipping process

39. If iron surface is coated with a thin layer of tin, the process is called____
a. Tinning
b. Galvanising
c. sherardizing
d. All of the above

40. ____involves binding firmly and permanently, a dense, homogeneous layer of a coating metal to the base metal on one or both the sides.
a. metal cladding
b. metal spraying
c. Galvanising

d. Sheradizing

41. ____is a process of cementation, using zinc powder as coating material.
a. metal cladding
b. metal spraying
c. Galvanising
d. Sherardizing

42. Metals commonly used as sacrificial anodes are ___
a. Zn
b. Al
c. Mg
d. all of the above

43. The greater is the content of humidity, the ____is the rate and extent of the corrosion.
a. greater
b. lower
c. both a and b
b. none of the above

44. Chemical formula of Rust is,
a. Fe_2O_3
b. FeO
c. Fe_3O_4
d. $Fe_2O_3.XH_2O$

45. Which of following metals could provide cathodic protection to Fe?
a. Al & Cu
b. Al & Zn
c. Zn & Cu
d. Al & Ni

46. Smaller the grain size, corrosion is,
a. Greater
b. Lower
c. Constant
d. Doesn't affected

47. Process of corrosion enhanced by,
a. AIR & Moisture
b. Electrolytes in water
c. Metallic impurities
d. All of above.

48. The process of deterioration of a metal due to unwanted chemical or electrochemical interaction of the metal with its environment is called _____

a. Electrolysis
b. Electrodialysis
c. Corrosion
d. Deposition

49. Which of the following is an example of corrosion?
a. Rusting of iron
b. Tarnishing of silver
c. Liquefaction of ammonia
d. Rusting of iron and tarnishing of silver

50. Metals does not exist in nature in the form of _____
a. Nitrates
b. Sulphates
c. Carbonates
d. Oxides

UNIT :-3 WATER TREATMENT

1.Molecular weight of calcium bicarbonate___
a. 165
b. 162
c. 168
d. 175

2.Water containing dissolved salts of chlorides and sulphates of calcium and magnesium is called____
a. Permanent hard water
b. Permanent soft water
c. Temporary hard water
d. Temporary soft water

3.Molecular weight of magnesium bicarbonate___
148
146
150
160

4.___is caused due to presence of calcium bicarbonate and magnesium bicarbonate.
a. Permanent hard water
b. Permanent soft water
c. Temporary hard water
d. Temporary soft water

5. Water which does not produce lather with soap solution readly, but form with curd, is called hard water.

a. Hard water
b. Soft water
c. both a and b
d. None of the above

6. In which water, washing becomes easy and no soap is waste during washing.

a. Hard water
b. Soft water
c. both a and b
d. None of the above

7. Which of the following impurities are present in water?

a. Dissolved
b. Suspended
c. Colloidal
d. all of the above

8. 1 PPM=____°French

a. 0.1
b. 0.01
c. 0.5
d. 14.3

9. 1 PPM=____°clark

a. 0.7
b. 0.07
c. 0.5
d. 14.3

10. Total Hardness=_____

a. Temporary hardness + Permanent hardness
b. Temporary hardness - Permanent hardness
c. Temporary hardness *Permanent hardness
d. Temporary hardness / Permanent hardness

11. _____ is the resistance of a material to plastic deformation by indentation.

a. Toughness
b. Resilience
c. Hardness
d. Stiffness

12. What is SI unit of hardness?

a. kg/m3
b. kg/m2

c. g/m2
d. N/m

13. The hardness of martensitic _____ with an increase in carbon content.
a. Increases
b. Decreases
c. Remains constant
d. First increases and then decreases

14. _____ is the strongest bond.
a. Van der Waals bond
b. Metallic bond
c. Covalent bond
d. Hydrogen bond

15. _____ improve hardness.
a. Strain hardening
b. Plasticizers
c. Over aging
d. Tempering

16. What is the hardness of silicon carbides?
a. 5-10 HV
b. 10-14 HV
c. 15-20 HV
d. 20-30 HV

17. When hardness is measured under dynamic loading conditions, it is known as _____ hardness.
a. Brinell
b. Rebound
c. Knoop
d. Rockwell

18. With an increase in temperature, hardness of material _____ and ductility _____
a. Increases, increases
b. Increases, decreases
c. Decreases, increases
d. Decreases, decreases

19. Which process increases the hardness of the material?
a. Tempering
b. Annealing
c. Quenching
d. Over aging

20. Which statement is false?
a. Alloying increases hardness of the pure metal
b. Dual phase alloys are harder than single phase alloys
c. Interstitial solid solutions are harder than substitutional solid solutions
d. Heat treatment always decreases the hardness of a material

21. Which scale is not used to measure indentation hardness?

a. Rockwell
b. Bennett
c. Shore
d. Brinell

22. Cooling rate _____ with distance from the quenched end, and the hardness _____
a. Increases, increases
b. Increases, decreases
c. Decreases, increases
d. Decreases, decreases

23. Stamping operation increases hardness.
a. True
b. False

24. Which microconstituent of Steel is hardest?
a. Spheroidite
b. Pearlite
c. Bainite
d. Martensite

25. Coarse pearlite is harder than fine perlite for the same composition of Steel.
a. True
b. False

26. Hardness of water is due to the presence of salts of _____
a. Potassium
b. Chlorine
c. Magnesium
d. Boron

27. 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

28. 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

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

b. False

30. 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

31. Hardness of water is conventionally expressed in terms of equivalent amount of _____

a. H_2CO_3
b. $MgCO_3$
c. $CaCO_3$
d. $Na_2 CO_3$

32. The chemical equivalent of $MgSO_4$ salt is _____

a. 60
b. 47.5
c. 82
d. 68

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

a. Parts per million
b. Degree centigrade
c. Degree clarke
d. Degree French

34. 1 degree Clarke = 1 part of $CaCO_3$ per _____ parts of water.

a. 10,000
b. 30,000
c. 50,000
d. 70,000

35. 1 ppm = _____

a. 0.07 0Fr
b. 0.70Fr
c. 0.10Fr
d. 0.010Fr

36. How many grams of MgCO3 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

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

a. True
b. False

38. The hardness that cannot be removed by boiling is called

a. temporary hardness
b. permanent hardness
c. semi temporary hardness
d. semi permanent hardness

39. Permanent hardness of water is caused due to the presence of dissolved

a. calcium hydrogen carbonates
b. magnesium hydrogen carbonates
c. chlorides of magnesium
d. Sulphates of magnesium

40. Temporary hardness of water is caused due to the presence of dissolved

a. calcium hydrogen carbonates only
b. magnesium hydrogen carbonates only
c. Sulphates and chlorides of calcium or magnesium
d. calcium hydrogen carbonates and magnesium hydrogen carbonates

41. The soft water contains the hardness of about _____

a. 0-45ppm
b. 0-55ppm
c. 0-65ppm
d. 0-75ppm

42. The hardness of moderately hard water is about _____

a. 75-150ppm
b. 75-120ppm
c. 75-130ppm
d. 75-100ppm

43. The very hard water has the hardness of CaCO3 is given by _____

a. 100-200ppm
b. 100-300ppm
c. 200-300ppm
d. Above 300ppm

44. The PH value of the drinking water is about _____

a. 6.5-8.5
b. 5.5-6.5
c. 4.5-5.5
d. 3.5-4.5

45. The drinking water can have the magnesium limit about _____

a. 10-150ppm
b. 20-150ppm
c. 30-150ppm
d. 40-150ppm

46. The chloride in drinking water range can be about _____

a. 200-600ppm
b. 300-600ppm
c. 400-600ppm
d. 500-600ppm

47. The iron is about the range in drinking water is _____

a. 1-1.5ppm
b. 0.01-0.1ppm
c. 1-1.1ppm
d. 0.1-1ppm

48. The phosphate is about the range of _____ in drinking water.

a. 5-10ppm
b. 10-15ppm
c. 15-20ppm
d. 20-25ppm

49. The organic matter in drinking water must be about _____

a. 0.2-1.0ppm
b. 1.0-2.0ppm
c. 2.0-3.0ppm
d. 3.0-4.0ppm

50. In _____ when the eater is heated then the soluble salts turns into insoluble ones and removed by filtration.

a. Temporary hardness
b. Permanent hardness
c. Non-carbonate
d. Non-alkaline

UNIT 4 SURFACECHEMISTRY

1. Surface chemistry deals with

A) Phenomena that occurs at the surface or interface
B) Phenomena that occurs at bulk
C) Both A & B
D) None of these

2. Which are the example of the surface chemistry
A) Corrosion
B) Crystallization
C) heterogeneous catalysis
D) All of these

3. Adsorption is a phenomena
A) It is a surface phenomena
B) It is a bulk phenomena
C) Both A & B
D) None of these

4. Absorption is a phenomena
A) It is a surface phenomena
B) It is a bulk phenomena
C) Both A & B
D) None of these

5. The process of removing an adsorbed substance from a surface on which it is adsorbed
A) Absorption
B) Adsorption
C) Desorption
D) None of these

6. In adsorption process if there is weak van der wall forces present is called
A) Physical adsorption
B) Chemical adsorption
C) Chemisorption
D) All of these

7. In adsorption process if there ii chemical bonds present is called
A) Physical adsorption
B) Physisorption
C) Chemical adsorption
D) None of these

8. substance which concentrates or accumulates at the surface is termed
A) Adsorbate
B) Adsorbent
C) Absorbate
D) Absorbent

9. Material on the surface of which the adsorption take placed is called
A) Adsorbate
B) Adsorbent
C) Absobate

D) Absorbent

10. Which are the characteristic of physical adsorption
A) It is not in specific in nature
B) It is reversible in nature
C) Enthalpy of adsorption is low
D) All of these

11. Which are the characteristic of chemical adsorption
A) It is not in specific in nature
B) It is reversible in nature
C) It is irreversible in nature
D) all of these

12. Which are the characteristic of chemical adsorption
A) It is specific in nature
B) It is irreversible in nature
C) enthalpy of adsorption is high
D) All of these

13. Which are the application of adsorption process
A) Production of high vacuum
B) Control of humidity
C) Both A & B
D) None of these

14. Which gel is used for controlling humidity
A) Silica
B) mercury
C) lead
D) silver

15. Langmuir adsorption isotherm
A) Explain the variation of adsorption with mass
B) Explain the variation of adsorption with pressure
C) Explain the variation of adsorption with mole
D) Explain the variation of adsorption with volume

16. In Langmuir adsorption isotherm
A) Adsorption is monolayer
B) Adsorption is multilayer
C) Both A & B
D) None of these

17. Langmuir adsorption isotherm is useful for
A) Heterogeneous substance

B) Homogeneous substance
C) Both A & B
D) None of these

18. Freundlichadsoption isotherm is
A) It gives an empirical relationship between the quantity of gas adsorbed by unit mass of solid adsorbent and pressure at a particular temperature.
B) It gives an empirical relationship between the quantities of gas adsorbed by unit volume of solid adsorbent.
C) It gives an empirical relationship between the quantities of gas absorbed by unit mass of solid adsorbent.
D) None of these

19. A catalyst
A) Initiate a reaction
B) Lower the activation energy of the reacting molecule
C) is capable of reacting with any of the reactant
D) Increase the activation energy of the molecule

20. A catalyst is a substance
A) It consume in the reaction
B) It converted into other substance
C) It dosen't consume in the reaction
D) All of these

21. Promoters are the substance
A) Increase the rate of reaction
B) Increase the conversion of reaction
C) Decrease the rate of reaction
D) Increase the yield of reaction

22. Poisons are the substance
A) Increase rate of reaction
B) Decrease rate of reaction
C) Decrease conversion of the reaction
D) Increase conversion of the reaction

23. Which catalyst is used for hydrogenation of vegetable oil?
A) Iron catalyst
B) Zinc catalyst
C) Nickel catalyst
D) Silver catalyst

24. Which catalyst is used ammonia production?
A) Iron catalyst
B) Zinc catalyst

C) Nickel catalyst
D) Silver catalyst

25. Which is biochemical catalyst?
A) Iron catalyst
B) Enzyme catalyst
C) Nickel catalyst
D) Silver catalyst

26. Example of enzyme catalyst
A) Inversion of cane sugar
B) Conversion of glucose into ethyl alcohol
C) Conversion of milk into curd
D) All of these

27. Characteristic of enzyme catalyst
A) Most highly efficient
B) Highly specific in nature
C) Active under optimum temperature
D) All of these

28. Colloid is
A) A colloid is a homogenies system.
B) A colloid is a heterogeneous system in which one substance is dispersed as very fine particles in another substance.
C) A colloid is a homogeneous system in which one substance is dispersed as very fine particles in the same substance.
D) None of these

29. Colloidal partial have diameter range
A) 1 to 5 m
B) 10 to 100 m
C) 500 to 800 m
D) 1 to 1000 nm

30. In aerosol type of colloid, for example smoke and dust
A) Dispersed phase is solid and dispersion medium is gas
B) Dispersed phase is liquid and dispersion medium is gas
C) Dispersed phase is solid and dispersion medium is liquid
D) Dispersed phase is liquid and dispersion medium is liquid

31. Foam colloid system
A) Dispersed phase is liquid and dispersion medium is gas
B) Dispersed phase is gas and dispersion medium is liquid
C) Dispersed phase is liquid and dispersion medium is liquid
D) Dispersed phase is solid and dispersion medium is gas

32. Milk and hair cream is example of
A) Aerosol colloid
B) Emulsion colloid
C) Foam colloid
D) None of these

33. Lyophilic colloids
A) Water loving
B) Water hating
C) Oil loving
D) None of these

34. Lyophobic colloids
A) Water loving
B) Oil loving
C) Oil hating
D) None of these

35. Which are the colloid purification process
A) Dialysis
B) Electro dialysis
C) Ultrafiltration
D) All of these

36. Which are the application of colloids
A) Purification of drinking water
B) medicines
C) Rubber industries
D) All of these

37. What is the size of colloidal particles?
a) 10-20 nm
b) More than 20 nm
c) Less than 10 nm
d) 30-50 nm

38. Which of the following is a characteristic of a colloid
a) It forms 2 layers with a solution
b) It forms turbid layers
c) It forms heterogeneous layer
d) It forms a homogeneous layer

39. Where does colloidal solution find application in?
a) In milk industries
b) In chromatic chemical industries
c) In crystallography

d) In textiles

40. During an experiment, accidently iodine got mixed up with a biological sample of proteins and polys. Identify the smallest colloid that can be obtained during the process of separation
a) Fats
b) Amino acids
c) R molecule
d) None of these

41. Which of the following form of colloid is considered to be the strongest colloid?
a) Gel
b) Foam
c) Solid Sol
d) Liquid sol

42. Which of the following form of colloid is considered to be the strongest colloid?
a) Gaseous foam
b) Solid sol
c) Sol
d) Liquid sol

43. What is the size of normal an amino acid?
a) 1-2 nm
b) 2-3 nm
c) 4-5 nm
d) 8-10 nm

44. What is called a dispersion phase?
a) It is the main layer
b) It is the secondary layer in which the colloidal particles are dispersed
c) It is the secondary layer
d) It is the basic colloidal layer

45. What is called a dispersion medium?
a) It is where the dispersed phase settles
b) It is where the solute particles settle
c) It is where the dispersed phase is suspended
d) It is the primary medium

46. What is the colloidal mixture of solid with solid called?
a) Solid sol
b) Liquid sol
c) Sol
d) Gel

47. What is the colloidal solution of liquid with solid called?

a) Sol
b) Gel
c) Foam
d) None of these

48. What is a colloidal solution of liquid in liquid called?
a) Foam
b) Form
c) Emulsification
d) Solid sol

49. What is the colloidal solution of liquid and gas called?
a) Aerosol
b) Gel
c) Sol
d) Emulsions

50. Which of the following colloidal combinations is not possible?
a) Liquid in solid
b) Solid in liquid
c) Gas in gas
d) Gas in solid

51. Identify the liquid-liquid emulsion from the following
a) Milk
b) Oil
c) Salt water
d) Sugar solution

52. Identify a sol from the following.
a) Stone
b) Paint
c) Ink
d) Rice milk

53. Identify a gel from the following
a) Curd
b) Cheese
c) Yogurt
d) Yolk

54. Identify the foam from the following
a) Bubble
b) Cake
c) Froths of air
d) Soap

55. Identify the form from the following
a) Cheese
b) Paint
c) Pumice stone
d) Cork

UNIT -5 PROPERTIES OF FLUIDS

1. Unit of surface tension
A) N/m
B) kg
C) m
D) s

2. Unit of viscosity
A) N.S
B) $N.s/m^2$
C) N
D) kg

3. Viscosity is define as
A) property of fluid which resist the flow
B) property of fluid which increase the flow
C) Both A & B
D) None of these

4. Molar volume is define as
A) mole per unit volume
B) mole per unit mass
C) mole per unit density
D) none of these

5. Density is define as
A) mass per unit volume
B) volume per unit mass
C) volume per unit length
D) none of these

6. additive property is define
A) It include the arrangement or structure of atom
B) It include the total contribution of atom creating a sum of all individual atoms like their molecule weight
C) Both A & B
D) None of these

7. Constitutive property is define as
A) It include the arrangement or structure of atom
B) It include the total contribution of atom creating a sum of all individual atoms like their molecular weight
C) Both A & B
D) None of these

8. Unit of molar volume

A) mol/m^2
B) mol
C) m^3
D) mol/m^3

9. Unit of dipole moment
A) kg
B) A°
C) m
D) N

10. Parachor is define as, d= density
A) M/d
B) m/γ
C) $\gamma^{1/4}$* M/d
D) None of these

11. Parachor is depend upon
A) molar mass
B) Density
C) Both A & B
D) None of thes

12. Physical properties of substance depend upon
A) Intermolecular forces
B) Constitution of molecule
C) Both a & b
D) None of these

13. Which give valuable information about the structure of molecule
A) Viscosity
B) Surface tension
C) Refractive index
D) All of these

14. How physical properties can be classified
A) Additive property
B) Constitutive property
C) Both A & B
D) None of these

15. Macleod study
A) Large number of liquid
B) Small number of liquid
C) Medium number of liquid
D) None of these

16. When did Macleod study about regarding parachors
A) 1920
B) 1923
C) 1930
D) 1945

17. When molar volume of liquid is equal to parachor
A) If surface tension maximum

B) If surface tension minimum
C) If surface tension unity
D) None of these

18. Atomic parachor is the contribution of each of the atoms present in the molecule
A) False
B) True
C) May be
D) Cannot predict

19. Structural parachor is the contribution of various bonds present in the molecule
A) True
B) False
C) May be
D) Can not predict

20. Who study more accurate measurement of surface tension
A) Macleod
B) Sugden
C) Vogel
D) None of these

21. What is the value of carbon in sugden
A) 2
B) 3
C) 3.5
D) 4.8

22. What is the value of carbon in Vogel
A) 4.8
B) 8.6
C) 9.5
D) 10

23. What is the value of single bond in Sudgen
A) 0
B) 1
C) 2
D) 3

24. What is the value of single bond in Vogel
A) 0
B) 1
C) 2
D) 3

25. Viscosity is due to
A) Intermolecular repulsion
B) Intermolecular attraction
C) Independent on intermolecular attraction
D) Independent on intermolecular repulsion

26. Dunstan rule is related to
A) viscosity coefficient
B) Molecular volume

C) Both A & B
D) None of these

27. Dustan rule for normal liquid value lies between
A) 40-60
B) 70-80
C) 100-200
D) 500-1000

28. Molar viscosity is product of
A) Molar surface & density
B) Viscosity & mass
C) Molar surface & Viscosity
D) None of these

29. Trope and Rodger found that
A) Molar viscosity is additive property at melting point
B) Molar viscosity is additive property at boiling point
C) Molar viscosity is additive property at freezing point
D) Unrelated to molar viscosity

30. When did Trope and Rodge did study of molar properties
A) 1860
B) 1870
C) 1894
D) 1900

31. What is the value of Hydrogen in sugden
A) 4.8
B) 10.5
C) 17.1
D) 15

32. What is the value of oxygen in sugden
A) 10
B) 20
C) 30
D) 40

33. What is the value of Hydrogen in Vogel
A) 16.7
B) 14.7
C) 15.7
D) 10.7

34. What is the value of oxygen in Vogel
A) 20
B) 19.8
C) 18
D) 10.8

35. Rheochor may be define as
A) Molar volume of the liquid at the temperature at which it's viscosity is unity
B) Molar volume of the liquid at the temperature at which it's viscosity is minimum
C) Molar volume of the liquid at the temperature at which it's viscosity is miximum

D) None of these

36. Rheochor is

A) Additive property
B) Constitutive property
C) Both Additive property & Constitutive property
D) None of these

37. In HCl molecule

A) Bonding electron pair is not shared equally
B) Bonding electron pair is shared equally
C) Both A & B
D) Cannot predict

38. Which are the type of molecular spectra

A) Electronic spectra
B) Vibrational spectra
C) Rotational spectra
D) All of these

39. How many type of structure of nitro group present

A) 1
B) 2
C) 3
D) 4

40. Which spectra is used to determine the bond lengths in heterogeneous molecule

A) Rotational spectra
B) Vibrational spectra
C) Electronic spectra
D) None of these

41. In linear structure

A) Dipole moment is maximum
B) Dipole moment is minimum
C) Dipole moment is zero
D) Cannot predict

42. In double bond what is the value of sugden

A) 23.2
B) 10
C) 20.5
D) 40

43. In 6 membered ring what is the value of sugden

A) 5
B) 6
C) 6.1
D) 8

44. In 6 membered ring what is the value of Vogel

A) 1.4
B) 2
C) 5
D) 6.4

45. What is infrared radiation range
A) 10 micro meter
B) 20 micro meter
C) 2 micro meter
D) 100 micro metr

46. What is long form of NMR
A) Nuclear magnetic resonance spectroscopy
B) Nuclear magnet resonance spectroscopy
C) Nuclear magnetic response spectroscopy
D) None of these

47. Which type of region present in Infrared spectroscopy
A) Functional group
B) Fingerprint
C) Both A & B
D) None of these

48. What are the position in vibrational spectra
A) Contracted position
B) Equilibrium position
C) Stretched position
D) All of these

49. What are the type of isomers
A) Ortho
B) Para
C) Meta
D) All of these

50. 1 A° is how much meter
A) 10^{-10}
B) 10^{-9}
C) 10^{10}
D) 10^{-11}

STANDARD SOLUTION &; ELECTROMETRIC METHODS OF ANALYSIS:

1. Which of the following is not the characteristic of a reference electrode?
a) It must have a known output potential
b) It must have a constant output potential
c) Its output potential is dependent on the composition of the solution
d) It is employed in conjunction with the indicator or working electrode

2. Why is Standard hydrogen electrode called as the primary reference electrode?
a) It has a known output potential
b) It has a constant output potential
c) Its output potential is independent of the composition of the solution
d) Its output potential is zero volts

3. Which of the following is the simple and most convenient hydrogen electrode?
a) Pascal Hydrogen electrode
b) Bourne Hydrogen electrode

c) Hilderbant Hydrogen electrode
d) West Hydrogen electrode

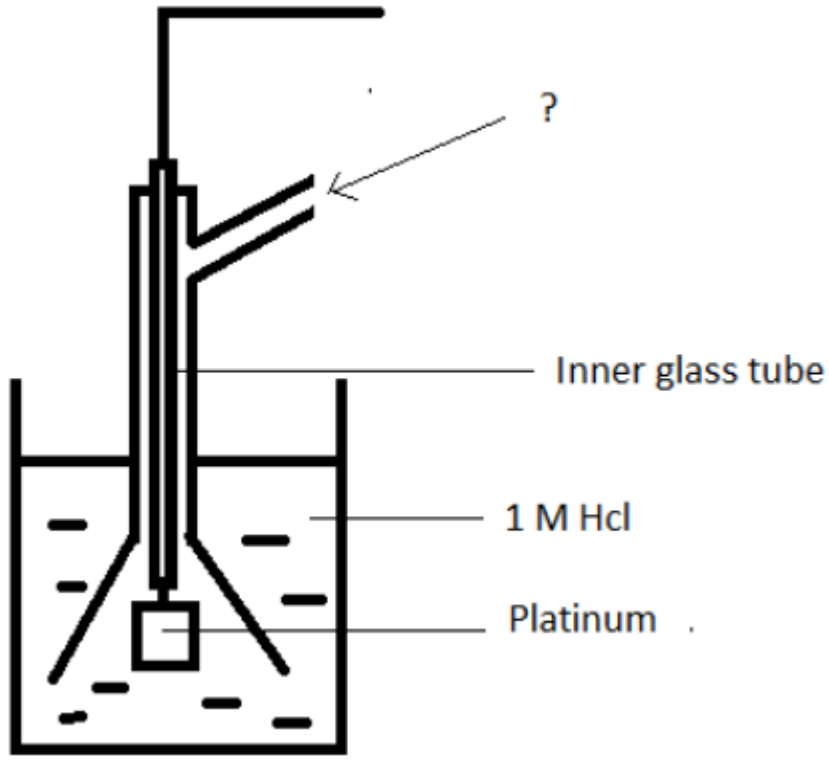
4. Which of the following is not the disadvantage of hydrogen electrode?
a) Platinum can be easily poisoned
b) Presence of oxidising agents alters the potential
c) It gives a salt error
d) H_2 gas at 1 atmospheric pressure is difficult to set up and transport

5. In Hydrogen electrode, the electrode is placed in a solution of ____ M Hcl. Fill in the blank.
a) 0.5
b) 1
c) 2
d) 3

6. Hydrogen electrode which is the reference electrode can be used as which of the following?
a) Anode only
b) Cathode only
c) Anode or Cathode
d) Salt bridge

7. If hydrogen electrode acts as cathode, hydrogen is reduced.
a) True
b) False

8. Given below is a diagram of hydrogen electrode. Identify the unmarked component.



a) Hydrogen at 1 atm
b) Hydrogen at 10 atm
c) Helium at 1 atm
d) Helium at 10 atm

9. The composition of glass membrane in glass electrode cannot have which of the following?
a) Sodium silicate
b) Calcium silicate
c) Lithium silicate
d) Barium silicate

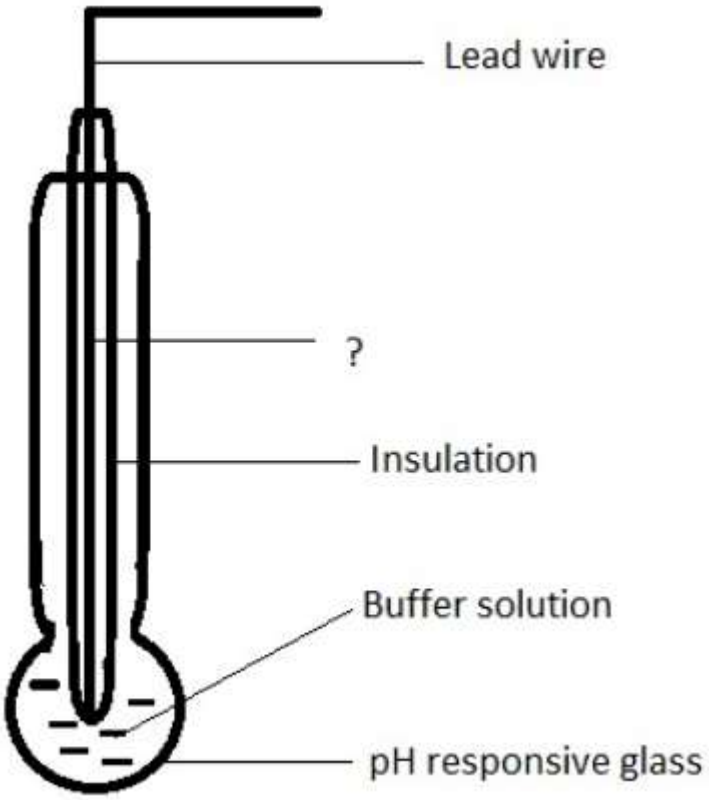
10. Which of the following is the purpose of added membranes in the glass membrane of the glass electrode?
a) They act as tightners
b) They act as filters
c) They act as conditioners
d) They act as collectors

11. Which of the following cannot form the inner reference electrode in glass electrodes?
a) Silver electrode
b) Copper electrode
c) Calomel electrode
d) Silver chloride electrode

12. The pH response of glass electrode is limited entirely to the area of the special glass membrane bulb.
a) True
b) False

13. Which of the following is not the advantage of glass electrodes?
a) It gives accurate results for high as well as low pH values
b) It is simple to operate
c) It has no salt error
d) Modern electrodes can withstand severe treatment

14. Given below is the diagram of glass electrode. Identify the unmarked component.



a) Platinum leads
b) Silver wire coated with silver chloride
c) Copper wire
d) Platinum reference electrode

15. Which of the following cannot be used as secondary reference electrode?
a) Calomel electrode
b) Silver-silver chloride electrode
c) Mercury-mercury sulphate electrode
d) Glass electrode

16. Which of the following is known as calomel?
a) Silver chloride
b) Mercury chloride
c) Potassium chloride
d) Mercury sulphate

17. The calomel electrodes are classified based on which of the following?
a) Materials used in the electrode
b) Amount of mercury present
c) Concentration of Kcl
d) Purity of mercury

18. Which of the following calomel electrodes are used for accurate work?
a) Saturated calomel electrode
b) Electrode with 0.1M Kcl
c) Electrode with 1M Kcl
d) Electrode with 2M Kcl

19. Calomel electrode can behave as which of the following components?
a) Anode only
b) Cathode only
c) Anode or cathode
d) Salt bridge

20. When the calomel electrode acts as the cathode which of the following does not occur?
a) Mercury ions are discharged at the electrode
b) More calomel passes into the solution
c) There is a decrease in the concentration of chloride ions
d) There is an increase in the concentration of chloride ions

21. Which of the following is the formula for pH calculation?
a) log10[H+]
b) -log10[H+]
c) log2[H+]
d) -log2[H+]

22. Which of the following is the value of hydrogen ion concentration of pure water?
a) 1×10^{7} moles/litre
b) 1×10^{5} moles/litre
c) 1×10^{6} moles/litre
d) 1×10^{8} moles/litre

23. pH meters can be considered as voltage sources with which of the following internal resistances?
a) Very low resistance
b) Moderate resistance
c) Very high resistance
d) No resistance

24. The electrodes used in pH measurement have which of the following internal resistances?
a) Very low resistance
b) Moderate resistance
c) Very high resistance
d) No resistance

25. Which of the following is not a failure in pH meters?
a) Defective electrodes
b) Defective input circuitry
c) Defective electronic circuitry
d) Defective calibration

26. Which of the following is the simplest of pH meters?
a) Null-detector type pH meter
b) Direct reading type pH meter
c) Digital pH meter
d) Modern pH meter

27. Which of the following is not the characteristic of direct reading type pH meters?
a) Simple operation
b) Quick to use
c) Continuous indication output
d) It requires balancing process

28. In a potentiometric DVM _____
a) voltage is compared
b) current is compared
c) resistance is compared
d) power is compared

29. . Unknown voltage is _____
a) converted to current
b) boosted
c) filtered
d) measured using a voltmeter

30. Accuracy of a potentiometric DVM is _____
a) zero
b) medium
c) low
d) high

31. What is the percent by weight of C in CO_2?
Molecular weight of C and Oxygen are 12 and 16 respectively?
a) 25
b) 50
c) 75
d) None of the mentioned

32. How many moles of Hydrogen are there in 1 mole of $(NH_4)_2HPO_4$?
a) 1
b) 4
c) 5
d) 9

33. Which of the following is not the unit of concentration?
a) Mole/m^3
b) Molar
c) N/m^3
d) ppm

34. What is the concentration of a 22 grams of carbon dioxide occupying 0.5 m^3 volume?
a) 1 mole/m^3
b) 2 mole/m^3
c) 11 mole/m^3
d) 22 mole/m^3

35. What is the molarity of a solution with a mass of solute 10 kg mass and 100 liter volume?
a) 0.1 molar
b) 1 molar
c) 10 molar
d) 100 molar

36. What is the concentration of a solution with 10 grams of calcium in 1000 m^3 of water?
a) 150 ppm
b) 250 ppm
c) 800 ppm
d) 1000 ppm

37. How much Sodium is there in a solution with 10 Kg of solvent (Density = 5 Kg/m^3) and concentration 4 molar?
a) 23 grams
b) 92 grams
c) 184 grams
d) 276 grams

38. What is the molar concentration of a solution with 49 grams of H_2SO_4 in 0.5 liter solution?
a) 1 mole/liter
b) 2 mole/liter
c) 3 mole/liter
d) 4 mole/liter

39. A solution has 25% w/w solution of Sodium Chloride in 10 grams of water what is the mole fraction of Sodium Chloride?
a) 0.05
b) 0.06
c) 0.07
d) 0.08

40. A mixture of gases SO_2, O_2 and 4 g of N_2 and total mass of mixture is 10 g, what is the sum of mole fraction of SO_2 and O_2?
a) 0.25
b) 0.5
c) 0.75
d) 1

41. . A neutral gas that is made of nitrogen and hydrogen only contains 7 g of nitrogen is in a mixture of with total mass 17 g, what is the mass fraction of the gas?
a) 0.5
b) 0.25
c) 0.45
d) 0.8

42. A mixture contains 9 gram each of H_2O and NaCl, what is the mole fraction of NaCl?
a) 0.15
b) 0.23
c) 0.45
d) 0.64

43. The quantity of solute per unit volume is _____
a) Mole
b) Concentration
c) Density
d) None of the mentioned

44. Find the correct statement for ppm
a) For solids and liquids, it is mole ratio
b) For gases, it is mole ratio
c) It is mole ration for every phase of matter
d) It is mass ratio for every phase of matter

45. A student has two solution of a substance. Solution-1: 25M, 400mL and Solution-2: 30M, 300M. What is the molarity of the final solutions if these two solutions are mixed?

a) 27.14
b) 22.14
c) 14.22
d) 14.27

46. How many molecules are present in 691 g of K_2CO_3?
3
4
5
6

47. What is the volume occupied by 1 mole of gas at given set of temperature and pressure called?
Standard volume
Atomic volume
Molar volume
None of above

48. What is the standard temperature defined by STP?
273.15 K
283.15K
293.15K
None of above

49. What is the standard volume defined by STP in m^3/kmol?
22.4
23.4
24.4
25.4

50. What is the standard pressure defined by STP?
1 atm
1 bar
1 pascal
1 mm Hg

51. 1. What is the value of the ionic product of water at 298k?
a) $7 \times 10^{-14}/mol^2L^2$
b) $1 \times 10^{-10}/mol^2L^2$
c) $1 \times 10^{-14}/molL^2$
d) $1 \times 10^{-14}/mol^2L^2$

52. The ionization constant of water increases with increase in temperature.
a) true
b) false

53. Write pH in terms of concentration of hydrogen ion?
a) $[H^+] = 1^{-pH}$
b) $[H^+] = 10^{-pH}$
c) $[H^+] = 10^{pH}$
d) $[H] = 10^{-pH}$

54. What is the pK_W at 298 k?
a) 14
b) 7

c) 1
d) 0

55. Which of the following has a PH greater than 7?
a) gastric juice
b) vinegar
c) blood plasma
d) lemon juice

56. NaCl is a _____ salt.
a) Normal
b) Acidic
c) Basic
d) Double

57. Which of the following is not a simple buffer?
a) CH_3COONH_4
b) NH_4CN
c) $H_3PO_4 + NaH_2PO_4$
d) $(NH_4)_2\ CO_3$

58. Which of the following is not a type of Acidic buffer mixture?
a) Na2HPO4 + Na3PO4
b) $CH_3COOH + CH_3COONa$
c) $H_2CO_3 + Na_2CO_3$
d) $H_3PO_4 + NaH_2PO_4$

59. Which of the following is not a type of Basic buffer mixture?
a) NH_4OH
b) NH_4Cl
c) $H_2CO_3 + Na_2CO_3$
d) Glycine + Glycine hydrochloride

60. What is the molecular weight of water?
a) 10 g/mol
b) 20 g/mol
c) 8 g/mol
d) 18 g/mol

61. The solubility product expression for tin(II) hydroxide, $Sn(OH)_2$, is
(a) $[Sn^{2+}][OH^-]$
(b) $[Sn^{2+}]^2[OH^-]$
(c) $[Sn^{2+}][OH^-]^2$
(d) $[Sn^{2+}]^3[OH^-]$

62. (e) $[Sn^{2+}][OH^-]^3$

63. The solubility product expression for silver(I) sulfide, using x to represent the molar concentration of silver(I) and y to represent the molar concentration of sulfide, is formulated as:
(a) xy
(b) x^2y
(c) xy^2
(d) x^2y^2
(e) xy^3

64.

The degree of dissociation of Ammonium hydroxide increases in the presence of Ammonium Chloride because of _____
a) solubility product
b) common Ion effect
c) hydrolysis of the salt
d) mixed salts

65. Common Ion effect can be used in which of the following cases?
a) cloth making
b) alcohol purification
c) quantitative analysis
d) qualitative analysis

66. Hydroxide Ion concentration in calcium hydroxide and barium Hydroxide is an example of _____ solution.
a) isochoric solution
b) isohydric solutions
c) hypo solution
d) hyper solution

67. Precipitate is formed if ionic product is _____
a) greater than the solubility product
b) less than the solubility product
c) equal to the solubility product
d) independent of the solubility product

68. A salt is soluble is the solubility is _____
a) less than 0.01 M
b) in between 0.01 M and 0.1 M
c) greater than 0.01 M
d) greater than 0.1 M

69. If K_{sp} of a salt A_2B_3 is given by 1×10^{-25}. Then find the solubility of the salt?
a) 10^{-3}
b) 10^{-4}
c) 10^{-5}
d) 10^{-8}

70. Both the solubility product and ionic product are applicable to all types of solutions.
a) true
b) false

71. A zinc ion is formed due to oxidation.
a) true
b) false

Unit-6
BASIC CONCEPTS OF CHEMICAL ANALYSIS :

1. For the separation of which of the following substances, Gas-solid chromatography is being used?
a) Thermally stable organic components

b) Volatile organic components
c) Thermally stable inorganic components
d) Low molecular weight gaseous species

2. Which of the following is not a feature of carrier gas used in gas chromatography?
a) It must be chemically inert
b) It should be suitable for the detector employed
c) It should not be completely pure
d) It should be cheap

3. Which of the following is the disadvantage of hydrogen, which can be used as carrier gas in gas chromatography?
a) Dangerous to use
b) Expensive
c) Reduced sensitivity
d) High density

4. Which of the following is the disadvantage of helium, which can be used as carrier gas in gas chromatography?
a) Dangerous to use
b) Expensive
c) Reduced sensitivity
d) High density

5. Which of the following is the disadvantage of nitrogen, which can be used as carrier gas in gas chromatography?
a) Dangerous to use
b) Expensive
c) Reduced sensitivity
d) High density

6. Slow injection of large samples leads to band broadening and loss of resolution.
a) True
b) False

7. In which of the following methods are liquid samples injected into the column in gas chromatography?
a) Gas tight syringe
b) Micro-syringe
c) Rotary sample valve
d) Solid injection syringes

8. What must be done to the solid samples for it to be introduced into the column without using solid injection syringes in gas chromatography?
a) Introduced in hot-zone of the column
b) Dissolved in volatile liquids
c) Introduced using rotary sample valve
d) Introduced using sampling loops

9. Which of the following is the commonly used support material for the packed column in gas chromatography?
a) Glass
b) Metal

c) Diatomaceous earth
d) Stainless steel

10. Which of the following is the advantage of a straight packed column?
a) It can be packed uniformly
b) It can be repacked easily
c) It is compact
d) It is easier to heat it evenly

11. . Chromatography is a physical method that is used to separate and analyse _____
a) Simple mixtures
b) Complex mixtures
c) Viscous mixtures
d) Metals

12. In which type of chromatography, the stationary phase held in a narrow tube and the mobile phase is forced through it under pressure?
a) Column chromatography
b) Planar chromatography
c) Liquid chromatography
d) Gas chromatography

13. In chromatography, the stationary phase can be _____ supported on a solid.
a) Solid or liquid
b) Liquid or gas
c) Solid only
d) Liquid only

14. In chromatography, which of the following can the mobile phase be made of?
a) Solid or liquid
b) Liquid or gas
c) Gas only
d) Liquid only

15. Which of the following cannot be used as an adsorbent in Column adsorption chromatography?
a) Magnesium oxide
b) Silica gel
c) Activated alumina
d) Potassium permanganate

16. Which of the following types of chromatography involves the separation of substances in a mixture over a 0.2mm thick layer of an adsorbent?
a) Gas liquid
b) Column
c) Thin layer
d) Paper

17. Chromatography cannot be used to purify volatile substances.
a) True
b) False

18. In Column chromatography, the stationary phase is made of _____ and the mobile phase is made of _____
a) Solid, liquid
b) Liquid, liquid

c) Liquid, gas
d) Solid, gas

19. Chromatography cannot be used to separate delicate products.
a) True
b) False

20. In Thin layer chromatography, the stationary phase is made of _____ and the mobile phase is made of _____
a) Solid, liquid
b) Liquid, liquid
c) Liquid, gas
d) Solid, gas

21. $KMnO_4$ reacts with oxalic acid according to the equation given below. Here 20 mL of 0.1 M $KMnO_4$ is equivalent to how many mL and molarity of $H_2C_2O_4$?
$2MnO_4^- + 5C2O_4^- + 16H^+ \rightarrow 2Mn^{+1} + 10CO_2 + 8H_2O$
a) 20 mL of 0.5 M $H_2C_2O_4$
b) 50 mL of 0.5 M $H_2C_2O_4$
c) 50 mL of 0.1 M $H_2C_2O_4$
d) 20 mL of 0.1 M $H_2C_2O_4$

22. Excess of KI reacts with $CuSO_4$ solution and then $Na_2S_2O_3$ solution is added to it. Which of the statement is incorrect for this reaction?
a) $Na_2S_2O_3$ is oxidized
b) CuI_2 is formed
c) Cu_2I_2 is formed
d) Evolved I_2 is reduced

23. How many number of moles of $KMnO_4$ will react with 180 gm $H_2C_2O_4$ according to given reaction?
$KMnO_4 + H_2C_2O_4 \rightarrow 2C0_2 + Mn^{2+}$
a) 4/5
b) 2/5
c) 1/5
d) 4/3

24. What is the volume of 0.05 M $KMnO_4$ which will react with 50 ml of 0.1 M H_2S in acidic medium ($H_2S \rightarrow S0_2$)?
a) 60 ml
b) 6 ml
c) 12 ml
d) 120 ml

25. What is the concentration of H_2O_2 solution of 20 ml of H_2O_2 solution which will react completely with 10 ml of 2 M $KMnO_4$ in acidic medium?
a) 1.25 M
b) 5 M
c) 2.5 M
d) 25 M

26. Which of the following is released when a Hydrogen atom loses an electron?
a) Nucleus
b) Proton

c) Charge
d) Ion

27. Which of the following is an example of amphoteric molecule?
a) Acetic acid
b) Malic acid
c) Sugars
d) Water

28. Acids that lose a proton easily are weak acids.
a) True
b) False

29. What is the full form of pH?
a) Positive hydrogen
b) Potential Hydrogen
c) Positron
d) Proton of hydrogen

30. A solution having a pH of 6 has a proton concentration of _____
a) 10^{-6} M
b) 10^{6} M
c) 6 M
d) 0.6 M

31. Buffers react with _____ ions.
a) hydrogen, hydroxyl
b) magnesium, calcium
c) potassium
d) sodium

32. Carbonic acid and bicarbonate ions buffer which of the following?
a) Cytosol
b) Cytoplasm
c) Blood
d) Lymph

33. Acid base pair that differ by only one proton is called conjugate acid base pair(true/false)

34. Conjugate base is a wea base and vice versa ((true/false))

35. If degree of ionisation of 0.01 of decimolar solution of weak acid HA then pK_a of acid is:

(a) 2

(b) 3

(c) 5

(d) 7

36. Calculate the molar solubility of nickel hydroxide in 0.10 M sodium hydroxide.the ionic product of nickel hydroxide is $2.0 * 10^{-15}$
A) $3.3 * 10^{-13}$
B)$2 * 10^{-13}$
C) $5 * 10^{-13}$

D) none of these

37. Distribution law is define as, where Kd distribution coefficient

A) C_1/C_2= Kd
B) C1=Kd
C) C2=Kd
D) Kd

38. Distribution Coefficient have unit

A) kg
B) Mole
C) M
D) none of these

39. Solute is define as

A) it is small quantity which doesn't dissolved in solvent
B) it is small quantity which dissolved in solvent
C) both A & B
D) none of these

40. Find the pH of a solution when 0.01 M HCl and 0.1 M NaOH are mixed in equal volumes

(a) 12.65

(b) 1.04

(c) 7.0

(d) 2.0

41. Which of the following aqueous solution will be the best conductor of electricity

(a) NH_3

(b) CH_3COOH

(c) HCl

(d) $C_6H_{12}O_6$

42. In 0.10 M aqueous solution of pyridine (C_5H_5N), find the percentage of pyridine that forms pyridinium ion ($C_5H_5N^+H$) (K_b for $C_5H_5N = 1.7 \times 10^{-9}$)

(a) 1.6%

(b) 0.77%

(c) 0.0060%

(d) 0.013%

43. Highest pH will be recorded for which of the following solutions if they are equimolar

(a) $AlCl_3$

(b) $BaCl_2$

(c) $BeCl_2$

(d) LiCl

44. What will be the pH of a buffer solution having an equal concentration of B^- and HB ($K_b = 10^{-10}$ for B^-)

(a) 7

(b) 4

(c) 10

(d) 6

45 Find the increase in equilibrium concentration of Fe^{3+} ions if OH^- ions concentration decreases to 1/4th in the following reaction

$$Fe(OH)_{3(s)} \rightleftharpoons Fe^{3+}_{(aq)} + 3OH^-_{(aq)}$$

(a) 8 times

(b) 16 times

(c) 4 times

(d) 64 times

46. On increasing the concentration of reactants in a reversible reaction, then equilibrium constant will

(a) depend on the concentration

(b) increase

(c) unchanged

(d) decrease

47. Find the conjugate acid of NH_2^-

(a) NH_3

(b) NH_4OH

(c) NH_4^+

(d) NH_2^-

48.the salvation enthalpy of ions referred in term of salvation which is always negative ((true/false))

49.zirconiom phosphate is a salt((true/false))

50. acidity of sodium hydroxide is 2((true/false)