

DEPARTMENT OF CHEMISTRY
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I

Semester-



MODULE IV

1. Chiral molecules are those which are
 - a) Shows geometrical isomerism
 - b) Superimposable on their mirror images
 - c) Not superimposable on their mirror images**
 - d) Unstable molecules
2. Which of the following is not an example of chiral object?
 - a) Cylindrical helix
 - b) Square box**
 - c) Sandal or shoe
 - d) Glove

[Explanation: A square box is not chiral as it gives super-imposable mirror image.

All the other mentioned options does not give the super-imposable mirror images.]

- 3.** Chiral molecules which are non-super-imposable mirror images of each other are called
 - a) Diastereomers
 - b) Meso compounds
 - c) Racemic mixture
 - d) Enantiomers**
- 4.** Select the correct statement from the following option.

- a) Enantiomer rotate plane of polarised light in opposite direction and to different extent
 - b) Enantiomer rotate plane of polarised light in same direction but to different extent
 - c) Enantiomer rotate plane of polarised light in same direction and to same extent
 - d) Enantiomer rotate plane of polarised light in opposite direction but to same extent**
5. Select the **incorrect** statement from the following option.
- a) The physical properties of enantiomers are identical
 - b) In symmetrical environment, the chemical properties of enantiomers are identical
 - c) The enantiomers react at same rate and form products in same amounts in asymmetrical environment**
 - d) Enantiomers have different solubilities in same chiral solvent
6. The plane which divides the molecule into two equal parts so that each half is the mirror image of other half is called
- a) Centre of symmetry
 - b) Plane of symmetry**
 - c) Axis of symmetry
 - d) Angle of symmetry
7. When a molecule has a plane of symmetry, it will be _____
- a) Optically inactive**
 - b) Optically active
 - c) Both optically active and optically inactive
 - d) Enantiomer

8. A centre of symmetry is equivalent to _____ fold alternating axis of symmetry.
- a) One
 - b) Two**
 - c) Three
 - d) Four
9. Diastereomers are
- a) Geometrical isomers
 - b) Mirror images
 - c) Non-mirror images**
 - d) Unstable molecules
10. A plane of symmetry is equivalent to _____ fold alternating axis of symmetry.
- a) One**
 - b) Two
 - c) Three
 - d) Four
11. Which of the following is not a priority rule for R, S-Configuration?
- a) If the four atoms attached to the chiral centre are all different, priority depends on atomic number, with the atom of lower atomic numbers getting lower priority.
 - b) If the two atoms attached to chiral centre are same, the atoms attached to each of these first atoms are compared.
 - c) When there is a double bond or triple bond, both atoms are considered to be duplicated or triplicated.
 - d) If the four atoms attached to the chiral centre are all different, priority**

depends on atomic number, with the atom of higher atomic numbers getting lower priority.

12. If our eyes travel in counter clockwise direction from the ligand of highest priority to the ligand of lowest priority, the configuration is

a) R-Configuration

b) S-Configuration

c) E-Configuration

d) C-Configuration

13. According to the Cahn Ingold Prelog selection rules, the decreasing order of preference is

a) $-\text{NH}_2 > -\text{C}_6\text{H}_5 > -\text{CH}(\text{CH}_3)_2 > -\text{H}$

b) $-\text{CH}(\text{CH}_3)_2 > -\text{C}_6\text{H}_5 > -\text{H} > -\text{NH}_2$

c) $-\text{NH}_2 > -\text{CH}(\text{CH}_3)_2 > -\text{C}_6\text{H}_5 > -\text{H}$

d) $-\text{C}_6\text{H}_5 > -\text{CH}(\text{CH}_3)_2 > -\text{NH}_2 > -\text{H}$

[Explanation: The atom of higher atomic numbers gets higher priority. So, $-\text{NH}_2$ group has the highest priority of all.]

14. Which of the following compounds will exhibit cis-trans isomerism?

a) 2-butene

b) 2-butyne

c) 2-butanol

d) butanal

15. The isomers which can be inter converted through rotation around a single bond are:

a) conformers

b) diastereomers

c) enantiomers

d) positional isomers

16. Passivity is due to

(a) Higher EMF (b) Lower EMF **(c) Oxide film** (d) All

17. The process of gaining of electrons by metal ions with discharge of metal is called

a) De-electronation

b) Electronation

c) Reduction

d) Cathode

18. The anode of the galvanic cell has _____

a) Positive polarity

b) Negative polarity

c) No polarity

d) Neutral

19. The e.m.f of Daniel cell is _____

a) 1.02V

b) 1.00V

c) 1.09V

d) 2V

20. According to the convention, the Daniel cell is represented as _____

a) $\text{Zn} \mid \text{ZnSO}_4 \parallel \text{CuSO}_4 \mid \text{Cu}$, $E = 1.09$ volt

b) $\text{Zn} \mid \text{ZnSO}_4 \parallel \text{Cu} \mid \text{CuSO}_4$, $E = 1.09$ volt

c) $\text{ZnSO}_4 \mid \text{Zn} \parallel \text{CuSO}_4 \mid \text{Cu}$, $E = 1.09$ volt

d) $\text{Zn} \mid \text{ZnSO}_4 \parallel \text{CuSO}_4 \mid \text{Cu}$, $E = 1.09$ volt

21. According to the convention, the Daniel cell is represented as _____

a) $\text{Zn} \mid \text{ZnSO}_4 \parallel \text{CuSO}_4 \mid \text{Cu}$, $E = 1.09$ volt

b) $\text{Zn} \mid \text{ZnSO}_4 \parallel \text{Cu} \mid \text{CuSO}_4$, $E = 1.09$ volt

c) $\text{ZnSO}_4 \mid \text{Zn} \parallel \text{CuSO}_4 \mid \text{Cu}$, $E = 1.09$ volt

d) $\text{Zn} \mid \text{ZnSO}_4 \parallel \text{CuSO}_4 \mid \text{Cu}$, $E = 1.09$ volt

22. Decrease in free energy can be given by $-\Delta G =$ _____

a) nFE

b) n/FE

c) nF/E

d) F/nE

23. Generally electrode potential refers to _____

a) Reduction potential

b) Oxidation potential

c) Electron potential

d) Cannot be determined

24. In an open system, for maximum work, the process must be entirely

a) irreversible

b) reversible

c) adiabatic

d) Isothermal

25. The work done by a closed system in a reversible process is always ____ that done in an irreversible process.

- a) less than or more than
- b) equal to
- c) less than

d) more than

26. A spontaneous process

a. is reversible.

b. is irreversible.

c. may be reversible or irreversible depending on whether equilibrium is maintained throughout the process.

d. may be reversible or irreversible depending on the value of ΔS .

27. When heat is added to a pure liquid

a. the temperature increases and the entropy is unchanged.

b. the temperature increases and the entropy increases.

c. the temperature increases and the entropy decreases.

d. the temperature is unchanged and the entropy increases.

28. The following are state functions EXCEPT

a) H – enthalpy

b) q – heat

c) E – internal energy

d) S – entropy

29. Which statement is **incorrect**?

(a) At constant pressure, $\Delta H = \Delta E + P\Delta V$

(b) The thermodynamic symbol for entropy is S.

(c) Gibbs free energy is a state function.

(d) For an endothermic process, ΔH is negative.

30. The Helmholtz function F is given by

a) $U-TS$

b) $U+TS$

c) $-U-TS$

d) $-U+TS$

31. Gibbs function G is given by

a) $H-TS$

b) $U+PV$

c) $E+PV$

d) $U-TS$

32. The entropy of an isolated system always _____ and reaches _____ when equilibrium is reached.

a) remains constant, maximum

b) decreases, minimum

c) increases, maximum

d) decreases, constant

33. Which of the following is the correct equation?

a) $E = E^\circ [(2.303RT)/nF] \log_{10} [H^+]$.

b) $E = E^\circ + [(2.303RT)/nF] \log_{10} [H^+]$.

c) $E = E^\circ - [(2.303RT)/nF] \log_{10} [H^+]$.

d) $E = E^\circ / [(2.303RT)/nF] \log_{10} [H^+]$.

34. If the standard hydrogen electrode is used as the reduction electrode, then the emf is given by _____

a) $E_{\text{red}} = -E^\circ + (5/n) \log_{10} [H^+]$.

b) $E_{\text{red}} = -E^\circ - (0.0591/n) \log_{10} [H^+]$.

c) $E_{\text{red}} = E^{\circ} + (0.0591/n) \log_{10} [H^+]$.

d) $E_{\text{red}} = -E^{\circ} + (0.0591/n) \log_{10} [H^+]$.

35. _____ is the device used to measure the emf of the cell.

a) Voltmeter

b) Potentiometer

c) Ammeter

d) Multimeter

36. In corrosion, as a result of decay, the metals are not converted into _____

a) Oxides

b) Hydroxides

c) Carbonates

d) Peroxides

37. Iron undergoes corrosion to produce _____ coloured hydrated ferric oxide.

a) Red

b) Brown

c) Green

d) Blue

38. Anhydrous inorganic liquid metal surface in absence of moisture undergoes _____

a) Wet corrosion

b) Dry corrosion

c) Galvanic corrosion

d) Pitting corrosion

39. The rusting iron is the _____

a) Oxidation corrosion

- b) Liquid metal corrosion
- c) Wet corrosion
- d) Corrosion by other gases

40. Corrosion between the dissimilar metals is called as _____

a) Galvanic corrosion

- b) Dry corrosion
- c) Oxidation corrosion
- d) Concentration cell corrosion

41. Corrosion along the grain boundaries is called as _____

- a) Stress corrosion

b) Inter granular corrosion

- c) Water line corrosion
- d) Pitting corrosion

42. In Pourbaix diagram the redox reaction, $Fe^{2+} + 2e^- \rightarrow Fe_{(s)}$ is

- a) pH dependent

b) pH independent

- c) solvent dependent
- d) solvent independent

43. For the reduction of silver ions with copper metal the standard cell potential was found to be +0.46V at 25° C. The value of standard Gibbs energy, ΔG° will be (F = 96500 C mol⁻¹)

- a) -44.5KJ
- b) -98.0 KJ
- c) -89.0 KJ**
- d) -89.0 J

44. Passivity is due to

- a) Higher EMF
- b) Lower EMF
- c) Oxide film**
- d) All

45. Helmholtz free energy A is expressed as

- a. $A=U+TS$
- b) $A=H+TS$
- c) $A=U-TS$**
- d) $A=H-TS$

46. In a reversible process $\Delta_{\text{sys}} + \Delta_{\text{surr}}$ is

- a) >0
- b) <0
- c) ≥ 0
- d) $=0$**

47. The ionisation isomer of $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}(\text{NO}_2)\text{C}]$ is

- a) $[\text{Cr}(\text{H}_2\text{O})_4(\text{O}_2\text{N})]\text{Cl}_2$
- b) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2](\text{NO}_2)$**
- c) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}(\text{ONO})\text{Cl}]$
- d) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2(\text{NO}_2)] \text{H}_2\text{O}$

48. Identify the hard acid from the following:

- a) AlCl_3**
- b) N_2H_4
- c) H_2O
- d) OH^-

49. Entropy change for a spontaneous process is

- a) (-)ve
- b) (+)ve**
- c) 0
- d) both a and b

50. Identify from the following the compound that exhibits geometrical isomers

- a) Propene
- b) 3-hexene
- c) Butenedioic acid**
- d) Lactic acid

51. In a reversible process, entropy of the system

- a) increases
- b) decreases
- c) zero**
- d) remains constant

52. The name of the equation showing relation between electrode potential (E) standard potential (E°) and concentration of ions in solution is

- a) Kohlrausch equation **b) Nernst equation** c) Faradays equation d) Ohm's equation

53. Corrosion of metals involves

- a) Physical reaction b) chemical reaction **c) Both** d) none

54. Enantiomers are

- a) molecules that have a mirror image
b) molecules that have at least one stereogenic center
c) non-superimposable molecules
d) non-superimposable molecules that are mirror images of each other