1. Select wrong chemical reaction among the following:
   A) $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$
   B) $8\text{NH}_3 + 3\text{Cl}_2 \rightarrow 6\text{NH}_4\text{Cl} + \text{N}_2$
   C) $2\text{Ca(OH)}_2 + 2\text{Cl}_2 \rightarrow \text{Ca(ClO)}_2 + \text{CaCl}_2 + 2\text{H}_2\text{O}$
   D) $2\text{NaOH} + \text{Cl}_2 \rightarrow 2\text{NaCl} + \text{H}_2 + \text{O}_2$

   Ans: (D)

2. The co-ordination number and the oxidation state of the element ‘M’ in the complex $[\text{M(en)}_2 (\text{C}_2\text{O}_4)]\text{NO}_2$ {where (en) is ethan-1, 2 – diamine} are respectively
   A) 6 adn 3      B) 6 and 2      C) 4 and 3      D) 4 and 2

   Ans: (A)

3. In which of the following, homolytic bond fission takes places?
   A) Alkaline hydrolysis of ethyl chloride      B) Nitration of Benzene
   C) Addition of HBr to double bond      D) Free radical chlorination of methne

   Ans: (D)

4. Identify the correct statement in the following:
   A) Propan – 1 – ol and propan -2-ol are position isomers
   B) Ethanoic acid and methyl methanoate are position isomers
   C) n-butane and isobutene are functional isomers
   D) Dimethyl ether and ethanol are chain isomers

   Ans: (A)

5. Which of the following is not a biodegradable polymer?
   A) Glyptol
   B) Polyhydroxy butyrate – CO- β hydroxyl valerate
   C) Phbv
   D) Nylon-2-β hydroxyl

   Ans: (A)

6. $3\text{ClO}^- + \text{ClO}^- + 2\text{Cl}^- \rightarrow \text{ClO}_3^- + 2\text{Cl}_2$ is an example of
   A) Oxidation reaction      B) Reduction reaction
   C) Disproportionation reaction      D) Decomposition reaction

   Ans: (B)

7. Extraction of chlorine from brine solution is based on
   A) Acidification      B) Oxidation      C) Reduction      D) Chlorination

   Ans: (B)

8. Which of the following is not a favourable condition for physical adsorption?
   A) Higher critical temperature of adsorbate
   B) Low temperature
   C) High pressure
   D) High temperature

   Ans: (D)

9. The process which is responsible for the formation of delta at a place where rivers meets the sea is
   A) Cooloid formation      B) Peptization
   C) Emulsification      D) Coagulation

   Ans: (D)
10. A reaction has both $\Delta H$ and $\Delta S$ –ve. The rate of reaction
   A) Increases with increase in temperature
   B) Cannot be predicted for change in temperature
   C) Increases with decrease in temperature
   D) Remains unaffected by change temperature
   **Ans:** (A)

11. Plaster of Paris is represented as
   A) $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$  B) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$  C) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  D) $\text{CaSO}_4$
   **Ans:** (A)

12. Which of the following structure of a molecule is expected to have three bond pairs and one lone pair of electrons?
   A) Octahedral  B) Trigonal Planar  C) Pyramidal  D) Tetrahedral
   **Ans:** (C)

13. In the electrolysis of aqueous sodium chloride solution, which of the half cell reaction will occur at anode?
   A) $\text{H}_2\text{O}^+ + e^- \rightarrow \frac{1}{2} \text{H}_2$
   B) $\text{Na}^+ + e^- \rightarrow \text{Na}^0$
   C) $\text{Cl}^- + e^- \rightarrow \frac{1}{2} \text{Cl}_2 + e^-$
   D) $2\text{H}_2\text{O}^+ \rightarrow 0^2 + 4\text{H}^+ + 4e^-$
   **Ans:** (C)

14. Cannizzaro’s reaction is an example of auto oxidation
   A) It is a typical reaction of aliphatic aldehyde.
   B) It is a reaction answered by all aldehydes
   C) It is a reaction answered by only aldehydes containing $\alpha$ - hydrogen.
   D) It is a reaction answered only by aromatic aldehydes.
   **Ans:** (D)

15. The Glycosidic linkage present in sucrose is between
   A) $\text{C - 1 of } \alpha-\text{glucose and C - 2 of } \beta-\text{fructose}$
   B) $\text{C - 1 of } \beta - \text{galactose and C - 4 of } \alpha - \text{glucose}$
   C) $\text{C - 1 of } \alpha - \text{glucose and C - 4 of } \beta - \text{fructose}$
   D) $\text{C - 1 of } \alpha - \text{glucose and C - 4 of } \alpha - \text{glucose}$
   **Ans:** (A)

16. If $3.01 \times 10^{20}$ molecules are removed from 98 mg of $\text{H}_2\text{SO}_4$, then number of moles of $\text{H}_2\text{SO}_4$ left are
   A) $1.66 \times 10^{-3}$ mol  B) $0.1 \times 10^{-3}$ mol  C) $9.95 \times 10^{-2}$ mol  D) $0.5 \times 10^{-3}$ mol
   **Ans:** (D)

17. The Vant Hoff’s factor ‘$i$’ accounts for
   A) Extent of dissolution of solute
   B) Extent of mobility of solute
   C) Extent of solubility of solute
   D) Extent of dissociation of solute
   **Ans:** (D)

18. The correct set of quantum number for the unpaired electrons of chlorine atom is
   A) $3, 1, 1, \pm \frac{1}{2}$  B) $2, 1, -1, +\frac{1}{2}$  C) $3, 0, 0, \pm \frac{1}{2}$  D) $2, 0, 0, +\frac{1}{2}$
   **Ans:** (A)
19. The pressure of real gases is less than that of ideal gas because of
   A) Finite size of particles
   B) Increase in the kinetic energy of the molecule
   C) Intermolecular attraction
   D) Increase in the number of collisions
   Ans: (C)

20. Which of the following reagent cannot be used to oxidize primary alcohols to aldehydes?
   A) Pyridinium chloro chromate
   B) Heating in presence of Cu at 573 K
   C) KMnO₄ in acidic medium
   D) CrO₃ in anhydrous medium
   Ans: (C)

21. Square planar complex of the type M₆AXBL (where A, B, X and L are unidentate ligands) shows
    following set of isomers
   A) Two cis and one trans
   B) Two trans and one cis
   C) Two cis and two trans
   D) Three cis and one trans
   Ans: (A)

22. Which of the following crystal has unit cell such that a ≠ b ≠ c and α ≠ β ≠ γ ≠ 90°?
   A) KNO₃
   B) K₂SO₄
   C) K₂Cr₂O₇
   D) NaNO₃
   Ans: (C)

23. Which of the following element forms pπ - pπ bond with itself?
   A) Se
   B) Te
   C) N
   D) P
   Ans: (C)

24. According to crystal field theory, the M – L bond in a complex is
   A) partially covalent
   B) purely ionic
   C) purely co-ordinate
   D) purely covalent
   Ans: (B)

25. Which of the following aqueous solution has highest freezing point?
   A) 0.1 molal Al₂(SO₄)₃
   B) 0.1 molal BaCl₂
   C) 0.1 molal AlCl₃
   D) 0.1 molal NH₄Cl
   Ans: (D)

26. The correct order of increasing basic nature for the bases NH₃, CH₃NH₂ and (CH₃)₂NH in aqueous solutions
   A) NH₃ < CH₃NH₂ < (CH₃)₂NH
   B) CH₃NH₂ < NH₃ < (CH₃)₂NH
   C) CH₃NH₂ < (CH₃)₂NH < NH₃
   D) (CH₃)₂NH < NH₃ < CH₃NH₂
   Ans: (A)

27. The product formed during the following reaction are
   \[ \text{CH₃C(OCH₃) + HI} \]
   \[ \text{CH₃COCH₃ + H₂O} \]
   A) \[ \text{CH₄ + H₃C-CH(OCH₃)} \]
   B) \[ \text{CH₃I + H₃C-C(OH)CH₃} \]
   C) \[ \text{CH₃OH + H₃C-C(OI)} \]
   D) \[ \text{CH₃OCH₃ + H₃C-C(H)} \]
   Ans: (C)
28. Pick the correct statement among the following:
   A) Sodium lauryl sulphate forms an insoluble scum with hard water.
   B) Sodium dodecyl benzene sulphonate used in tooth paste is a cationic detergent.
   C) Cetyl trimethyl ammonium bromide is a popular cationic detergent used in air conditioner
   D) Non-ionic detergents is formed when polyethylene glycol reacts with adipic acid
   
   Ans: (A)

29. Which one of the following metallic oxide exhibit amphoteric nature?
   A) CaO  B) Na₂O  C) BaO  D) Al₂O₃
   
   Ans: (D)

30. In the following sequence of reactions
   \[
   \text{CH}_3\text{Br} \xrightarrow{\text{KCN}} \text{A} \xrightarrow{\text{H}_3\text{O}^+} \text{B} \xrightarrow{\text{LiAlH}_4} \text{C}
   \]
   The end product C is
   A) Ethyl Alcohol  B) Acetaldehyde  C) Acetone  D) Methane
   
   Ans: (A)

31. By passing electric current, NaClO₃ is converted into NaClO₄ according to teh following equation
   \[
   \text{NaClO}_3 + \text{H}_2\text{O} \rightarrow \text{NaClO}_4 + \text{H}_2
   \]
   How many moles of NaClO₄ will be formed when three Faradays of charge is passed through NaClO₃?
   A) 1.5  B) 1.0  C) 3.0  D) 0.75
   
   Ans: (A)

32. Which of the following statement is wrong regarding Lanthanoids?
   A) The ionic size of Ln (III) ions decreases with increasing atomic number.
   B) Ln (III) hydroxides are mainly basic in nature
   C) Ln (III) compounds are predominantly ionic in character
   D) Ln (III) compounds are generally colourless
   
   Ans: (D)

33. Which one of the following is not a common component of photo-chemical smog?
   A) Ozone  B) Acrolein  C) Peroxy acetyl nitrate  D) Chloro fluoro carbons
   
   Ans: (A)

34. Which one of the following noble gas has an unusual property of diffusing through the materials such as rubber, glass or plastic?
   A) He  B) Kr  C) Ne  D) Ar
   
   Ans: (A)

35. When the pure solvent diffuses out of the solution through the semi-permeable membrane then the process is called
   A) Reverse osmosis  B) Dialysis  C) Osmosis  D) Sorption
   
   Ans: (A)

36. For a reaction \( \frac{1}{2} \text{A} \rightarrow 2\text{B} \) rate of disappearance of A is related to rate of appearance of B by the expression
   \[
   \begin{align*}
   \text{A) } & \quad \frac{-d[\text{A}]}{dt} = \frac{d[\text{B}]}{dt} \quad \text{B) } \quad \frac{-d[\text{A}]}{dt} = \frac{1}{2} \frac{d[\text{B}]}{dt} \quad \text{C) } \quad \frac{-d[\text{A}]}{dt} = \frac{1}{4} \frac{d[\text{B}]}{dt} \quad \text{D) } \quad \frac{-d[\text{A}]}{dt} = 4 \frac{d[\text{B}]}{dt}
   \end{align*}
   \]
   
   Ans: (C)
37. The equilibrium constant for the reaction
\[
\text{N}_2 (g) + \text{O}_2 (g) \rightleftharpoons 2\text{NO} (g)
\]
is \(4 \times 10^{-4}\) at 2000 K. In presence of a catalyst the equilibrium is
attained ten times faster. Therefore the equilibrium constant in presence of catalyst of 2000
k is
A) \(4 \times 10^{-2}\)  
B) \(40 \times 10^{-4}\)  
C) \(4 \times 10^{-4}\)  
D) \(4 \times 10^{-3}\)

Ans: (C)

38. The correct statement regarding defect in solids is
A) Schottky defect has no effect on the physical properties of solids
B) Frenkel defect is usually favoured by a very small difference in the sizes of cations and
anions
C) Frenkel defect is a dislocation defect
D) Trapping of proton in the lattice leads to the formation of F-centers

Ans: (C)

39. Which of the following statement is incorrect?
A) The rate law for any reaction cannot be determined experimentally
B) Molecularity is only applicable for elementary reaction.
C) Biomolecular reactions involve simultaneous collision between two species
D) Complex reactions have fractional order

Ans: (D)

40. Hydrogenation of vegetable oils in presence of finely divided Nickel as catalyst. The reaction
is
A) Heterogeneous catalysis  
B) Homogeneous catalysis
C) Enzyme catalysed reaction  
D) Liquid catalysed reaction

Ans: (A)

41. Lower members of aliphatic carboxylic acid are soluble in water. This is due to
A) Water is non electrolyte  
B) Due to London forces
C) Formation of hydrogen bonds with water  
D) Van der-Waals interaction with water molecules

Ans: (C)

42. For the preparation of Alkanes, aqueous solution of sodium or potassium salt of carboxylic
acid is subjected to
A) Electrolysis  
B) Oxidation
C) Hydrogenation  
D) Hydrolysis

Ans: (A)

43. Bactericidal antibiotics among the following is
A) Tetracycline  
B) Ofloxacin
C) Chloramphenicol  
D) Erythromycin

Ans: (B)

44. The standard reduction potential at 298 K for the following half cell reaction
\[
\text{Zn}^{2+}(aq) + 2e \rightarrow \text{Zn}(s) \quad E^o = -0.762 \text{ V}
\]
\[
\text{Cr}^{3+}(aq) + 3e \rightarrow \text{Cr}^{2+}(s) \quad E^o = 0.740 \text{V}
\]
\[
2\text{H}^+(aq) + 2e \rightarrow \text{H}_2(g) \quad E^o = 0.0 \text{V}
\]
\[
\text{F}_2(g) + 2e \rightarrow 2\text{F}^-(aq) \quad E^o = 2.87 \text{V}
\]
Which of the following is strongest reducing agent?
A) \(\text{H}_2(g)\)  
B) \(\text{Zn}(s)\)  
C) \(\text{F}_2(g)\)  
D) \(\text{Cr}^{2+}(s)\)

Ans: (B)
45. The magnetic nature of elements depends on the presence of unpaired electrons. Identify the configuration of transition elements which shows highest magnetic moment?
A) 3d<sup>2</sup>  B) 3d<sup>8</sup>  C) 3d<sup>7</sup>  d) 3d<sup>5</sup>
**Ans:** (D)

46. The electronegativities of C, N, Si and P are in the order of
A) Si < P < N < C  B) P < Si < N < C  C) Si < P < C < N  D) P < Si < C < N
**Ans:** (C)

47. The monomer used in Novolac, a polymer used in paints.
A) Butadiene and Styrene  B) Phenol and Formaldehyde  C) Butadiene and Acrylo Nitrile  D) Melamine and Formaldehyde
**Ans:** (B)

48. Which of the following order is true regarding the acidic nature of phenol?
**Ans:** (C)

49. Which of the following is the correct electron dot structure of N<sub>2</sub>O molecule?
A)  B)  C)  D)
**Ans:** (B)

50. In a face centred cubic arrangement of A and B atoms in which ‘A’ atoms are at the corners of the unit cell and ‘B’ atoms are at the face centers. One of the ‘A’ atom is missing from one corner in unit cell. The simplest formula of compound is
A) A<sub>7</sub>B<sub>3</sub>  B) A<sub>7</sub>B<sub>8</sub>  C) AB<sub>3</sub>  D) A<sub>7</sub>B<sub>24</sub>
**Ans:** (D)

51. The metal extracted by leaching with a cyanide is
A) Al  B) Na  C) Ag  D) Cu
**Ans:** (C)

52. Reduction of ketones cannot be carried out with which of the following reagents?
A) Zinc amalgam and concentrated HCl  B) Hydrazine and KOH in ethylene glycol  C) Sodium borohydride or Lithium Aluminium hydride  D) Hydrogen in presence of palladium in Barrium sulphate and quinoline
**Ans:** (D)

53. Gabriel phthalimide synthesis is used in the preparation of primary amine from phthalimide which of the following reagent is not used during the process?
A) HCl  B) NaOH  C) Alkyl Halides  D) KOH
**Ans:** (A)

54. Which of the following statement is in accordance with the Arrhenius equation?
A) Rate constant decreases exponentially with increase in temperature  B) Rate of reaction does not change with increase in activation energy  C) Rate of a reaction increases with decrease in activation energy  D) Rate of a reaction increases with increase in temperature
**Ans:** (A)
55. Addition of mineral acid to an aqueous solution of Borax, the following compound is formed
   A) Pyroboric acid  
   B) Boron hydride  
   C) Meta boric acid  
   D) Orthoboric acid  
   Ans: (D)

56. Hormones are secreted by ductless glands of human body. Iodine containing hormone is
   A) Testosterone  
   B) Adrenoline  
   C) Thyroxine  
   D) Insulin  
   Ans: (C)

57. Pick the wrong statement from the following:
   A) Consumption of citrus fruits and green leafy vegetables in food prevents scurvy  
   B) Deficiency of Vitamin B₆ (pyridoxime) results in convulsions  
   C) Deficiency of vitamin D causes xerophthalmia  
   D) Sources of Vitamin B₁ are yeast, milk, green vegetables and cereals  
   Ans: (C)

58. In the manufacture of hydrogen from water gas (CO + H₂), which of the following is correct statement?
   A) Hydrogen is isolated by diffusion  
   B) H₂ is removed by occlusion with pd  
   C) CO and H₂ are separated based on difference in their densities.  
   D) CO is oxidized to CO₂ with steam in the presence of a catalyst followed by absorption of CO₂ in alkali.  
   Ans: (D)

59. Toluene reacts with halogen in presence of Iron (III) chloride giving ortho and para halo compounds, The reaction is
   A) Nucleophilic substitution reaction  
   B) Free radical addition reaction  
   C) Electrophilic elimination reaction  
   D) Electrophilic substitution reaction  
   Ans: (D)

60. The reaction quotient ‘Qₑ’ is useful in predicting the direction of the reaction. Which of the following is incorrect?
   A) If Qₑ > Kₑ, the reverse reaction is favoured  
   B) If Qₑ < Kₑ, the forward reaction is favoured  
   C) If Qₑ > Kₑ, forward reaction is favoured  
   D) If Qₑ = Kₑ, no reaction occur  
   Ans: (C)