Useful data Gas constant $R = 8.314$ J/mol-K

1 Mark Questions

1. In CsCl crystal structure each Cs^+ ion is surrounded by
(a) 4 Cl^- (b) 6 Cl^-
(c) 8 Cl^- (d) 12 Cl^-

2. $Cr(NH_3)_5Cl_3$ reacts with $AgNO_3$ solution quantitatively. The number of moles of $AgNO_3$ consumed by one mole of the metal complex is
(a) 1.0 (b) 2.0
(c) 3.0 (d) 4.0

3. Bohr model can explain
(a) the spectrum of hydrogen atom only
(b) the solar system
(c) the spectrum of hydrogen molecule
(d) the spectrum of an atom or an ion containing only one electron

4. The hybridisation of oxygen in the molecule OF_2 is
(a) *sp* (b) sp^2
(c) sp^3 (d) dsp^2

5. The correct increasing order of electronegativity of the following elements is
(a) F < O < N < S
(b) S < N < O < F
(c) N < S < O < F
(d) O < N < S < F

6. Which of the following trihalides of nitrogen is least basic?
(a) NF_3 (b) NCl_3
(c) NBr_3 (d) NI_3

7. Which of the following compounds has the highest pH when dissolved in water?
(a) CH_3COONa (b) NH_4Cl
(c) NaCN (d) NaCl

8. Which of the following reactions will give oxygen?
(a) NaOH + F_2 (b) NaOH + Cl_2
(c) NaOH + Br_2 (d) NaOH + I_2

9. When 1-butyne is treated with sulphuric acid in the presence of mercuric sulphate then stable product formed is
(a) butyl sulphate (b) butan-2-one
(c) 2-buten-1-ol (d) butynediol

10. The compound that will not give chloroform on treatment with Cl_2 / NaOH is
(a) propanone (b) ethanol
(c) ethanal (d) propanol

11. Most reactive compound towards formation of cyanohydrin on treatment with KCN followed by acidification is
(a) benzaldehyde
(b) *p*-nitrobenzaldehyde
(c) phenylacetaldehyde
(d) *p*-hydroxy benzaldehyde

12. The compound with highest pK_a is expected to be
(a) *p*-nitrophenol (b) *p*-chlorophenol
(c) *p*-methylphenol (d) *p*-methoxyphenol

13. The method that would provide the highest yield of pure ethylbenzene is the reaction of benzene with
(a) ethanol and sulphuric acid
(b) ethyl chloride in the presence of aluminium chloride.
(c) acetyl chloride in the presence of aluminium chloride followed by reduction with $LiAlH_4$
(d) ethanoyl chloride in the presence of aluminium chloride

14. Most reactive halide towards S_N1 reaction is
(a) *n*-butyl chloride (b) *sec*-butyl chloride
(c) *ter*-butyl chloride (d) allyl chloride

15. Aldol condensation will be observed in
(a) chloral
(b) phenyl acetaldehyde
(c) cyclohexenal
(d) nitromethane

16. The predominant product of reduction of α-ketoester with sodium borohydride is
(a) primary alcohol (b) secondary alcohol
(c) alkane (d) vinyl borane

17. Toluene on reaction with N-bromosuccinimide gives
(a) *p*-bromomethyl benzene
(b) *o*-bromomethyl benzene
(c) phenyl bromomethane
(d) *m*-bromomethyl benzene

18. $CaCO_3(s) \longleftrightarrow CaO(s) + CO_2(g)$
The number of degrees of freedom for the above equilibrium reaction is
(a) 0 (b) 1
(c) 2 (d) 3

19. A catalyst is one which speeds up the reaction by
(a) decreasing the enthalpy of the reactants
(b) decreasing the free energy of the reaction
(c) increasing the kinetic energy of the reactants
(d) decreasing the activation energy of the reaction

20. In a chemical reaction, the fraction of the reactant consumed per unit time is independent of the initial concentration. The order of the reaction is
(a) indeterminate (b) two
(c) one (d) zero

21. If q is the amount of heat supplied by the system and W is the magnitude of the work done on the system, then change in internal energy of the system equals
(a) $-q+W$ (b) $q-W$
(c) $q+W$ (d) $-q-W$

22. A drop of ink put in a glass of water mixes uniformly with the passage of time. This is due to
(a) gravitational force
(b) minimization of potential energy
(c) maximization of entropy
(d) osmotic pressure of pure water

23. A 0.2 M solution of sugar is isotonic with a solution of common salt. Both solutions have the same volume and are at the same temperature. The concentration of the common salt solution is
(a) 0.1 M (b) 0.2 M
(c) 0.3 M (d) 0.4 M

24. The molar conductivity of a strong electrolyte varies
(a) linearly with concentration
(b) linearly with the square root of concentration
(c) inversely with concentration
(d) as the square of the concentration

25. That the specific heat of a stable solid is positive, can be derived from
(a) Gibbs-Helmholtz equation
(b) Kirchhoff's equation
(c) the first law of thermodynamics
(d) the second law of thermodynamics