1. Which of the following possess net dipole moment ?
   (A) BF_3
   (B) SO_2
   (C) CO_2
   (D) $BeCl_2$

2. The number of π-bonds and σ-bonds present in naphthalene are respectively
   (A) 5, 19
   (B) 6, 19
   (C) 5, 20
   (D) 5, 11

3. The reaction in which $\Delta H > \Delta U$ is
   (A) $CaCO_{3(s)} \longrightarrow CaO_{(s)} + CO_{2(g)}$
   (B) $N_{2(g)} + O_{2(g)} \longrightarrow 2NO_{(g)}$
   (C) $CH_{4(g)} + 2O_{2(g)} \longrightarrow CO_{2(g)} + 2H_2O_{(l)}$
   (D) $N_{2(g)} + 3H_{2(g)} \longrightarrow 2NH_{3(g)}$

4. The number of moles of electron required to reduce 0.2 mole of $Cr_2O_7^{-2}$ to Cr^{+3}
   (A) 6
   (B) 1.2
   (C) 0.6
   (D) 12

5. In the reaction $B(OH)_3 + 2H_2O \longrightarrow [B(OH)_4]^- + H_3O^+$
   $B(OH)_3$ functions as
   (A) Lewis base
   (B) Protonic acid
   (C) Lewis acid
   (D) Bronsted acid

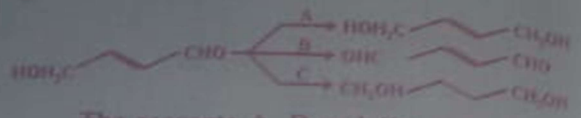
6. Match the following acids with their pKa values :

Acid		pKa
a. Phenol	i.	16
b. p-Nitrophenol	ii.	0.78
c. Ethanol	iii.	10.0
d. Picric acid	iv.	7.1

	a	b	c	d
(A)	ii	i	ii	iv
(B)	iii	iv	i	ii
(C)	iv	ii	iii	i
(D)	iii	i	iv	ii

7. Which of the following can be used to test the acidic nature of ethanol ?
   (A) Na_2CO_3
   (B) Blue litmus solution
   (C) Na metal
   (D) $NaHCO_3$

8.



The reagents A, B and C respectively are

(A) $NaBH_4$, alk. $KMnO_4$, H_2/Pd

(B) H_2/Pd, PCC, $NaBH_4$

(C) H_2/Pd, alk. $KMnO_4$, $NaBH_4$

(D) $NaBH_4$, PCC, H_2/Pd

9. Propanoic acid undergoes HVZ reaction to give chloropropanoic acid. The product obtained is

(A) as stronger as propanoic acid

(B) stronger acid than propanoic acid

(C) stronger than dichloropropanoic acid

(D) weaker acid than propanoic acid

10. $P \xrightarrow{H_2/Pd - BaSO_4} Q \xrightarrow[(ii)\ dil.\ HCl]{(i)\ con.\ NaOH} R + S$

R and S form benzyl benzoate when treated with each other. Hence P is

(A) $C_6H_5CH_2OH$

(B) C_6H_5CHO

(C) C_6H_5COOH

(D) C_6H_5COCl

11. Among the following, the main reactions occurring in blast furnace during extraction of iron from haematite are

i. $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$

ii. $FeO + SiO_2 \longrightarrow FeSiO_3$

iii. $Fe_2O_3 + 3C \longrightarrow 2Fe + 3CO$

iv. $CaO + SiO_2 \longrightarrow CaSiO_3$

(A) iii and iv

(B) i and ii

(C) i and iv

(D) ii and iii

12. Which of the following pair contains 2 lone pair of electrons on the central atom ?

(A) H_2O, NF_3

(B) I_3^-, H_2O

(C) SO_4^{2-}, H_2S

(D) XeF_4, NH_3

13. Which of the following statement is correct ?

(A) Cl_2 is a stronger oxidizing agent than F_2.

(B) Cl_2 oxidises H_2O to O_2 but F_2 does not.

(C) Fluoride is a good oxidising agent.

(D) F_2 oxidises H_2O to O_2 but Cl_2 does not.

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14. 0.1 mole of XeF_6 is treated with 1.8 g of water. The product obtained is

(A) XeO_2F_2

(B) XeO_3

(C) $Xe + XeO_3$

(D) $XeOF_4$

15. In the reaction of gold with aquaregia, oxidation state of Nitrogen changes from

(A) +6 to +4

(B) +4 to +2

(C) +3 to +1

(D) +5 to +2

16. The vitamin that helps in clotting of blood is

(A) C

(B) A

(C) K

(D) B_2

17. The polymer containing five methylene groups in its repeating unit is

(A) Nylon 6

(B) Nylon 6, 6

(C) Bakelite

(D) Dacron

18. Cis-1, 4-polyisoprene is called

(A) Neoprene

(B) Buna-N

(C) Natural rubber

(D) Buna-S

19. Which cleansing agent gets precipitated in hard water ?

(A) Sodium stearate

(B) Sodium lauryl sulphate

(C) Sodium dodecyl benzene sulphonate

(D) Cetyl trimethyl ammonium bromide

20. Anti-histamine among the following is

(A) Morphine

(B) Bromopheneramine

(C) Chloroxylenol

(D) Amoxycillin

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0.1 M

XeF_6 1.8 g

21. The elements in which electrons are progressively filled in 4f orbital are called

(A) Transition elements

(B) Actinoids

(C) Halogens

(D) Lanthanoids

22. Incorrect statement with reference to Ce ($Z = 58$)

(A) Ce in +3 oxidation state is more stable than in +4.

(B) Ce^{4+} is a reducing agent.

(C) Ce shows common oxidation states of +3 and +4.

(D) Atomic size of Ce is more than that of Lu.

23. A mixture of NaCl and $K_2Cr_2O_7$ is heated with conc. H_2SO_4, deep red vapours and formed. Which of the following statement is false ?

(A) The vapours contain CrO_2Cl_2 only.

(B) The vapours give a yellow solution with NaOH.

(C) The vapours when passed into lead acetate in acetic acid gives a yellow precipitate.

(D) The vapours contain CrO_2Cl_2 and Cl_2.

24. Which of the following statement is wrong ?

(A) Mn^{3+} and Co^{3+} are oxidizing agents in aqueous solution.

(B) In highest oxidation states, the transition metals show acidic character.

(C) All elements of 3d series exhibit variable oxidation states.

(D) Metals in highest oxidation states are more stable in oxides than in fluorides.

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25. Which among the following is the strongest ligand ?

(A) NH_3

(B) CN^-

(C) en

(D) CO

26. Which of the following is a network crystalline solid ?

(A) AlN

(B) I_2

(C) Ice

(D) NaCl

27. The number of atoms in 2.4 g of body centred cubic crystal with edge length 200 pm is

(density = 10 g cm^{-3}, $N_A = 6 \times 10^{23}$ atoms/mol)

(A) 6×10^{20}

(B) 6×10^{22}

(C) 6×10^{19}

(D) 6×10^{23}

28. 1 mole of NaCl is doped with 10^{-5} mole of $SrCl_2$. The number of cationic vacancies in the crystal lattice will be

(A) 6.022×10^{15}

(B) 6.022×10^{18}

(C) 12.044×10^{20}

(D) 6.022×10^{23}

29. A non-volatile solute, 'A' tetramerises in water to the extent of 80%. 2.5 g of 'A' in 100 g of water, lowers the freezing point by 0.3 °C. The molar mass of A in mol L^{-1} is (K_f for water = 1.86 K kg mol^{-1})

(A) 221

(B) 62

(C) 354

(D) 155

30. Solution 'A' contains acetone dissolved in chloroform and solution 'B' contains acetone dissolved in carbon disulphide. The type of deviations from Raoult's law shown by solutions A and B, respectively are

(A) positive and negative

(B) positive and positive

(C) negative and positive

(D) negative and negative

31. The mass of AgCl precipitated when a solution containing 11.70 g of NaCl is added to a solution containing 3.4 g of $AgNO_3$ is

[Atomic mass of Ag = 108, Atomic mass of Na = 23]

(A) 1.17 g

(B) 5.74 g

(C) 6.8 g

(D) 2.87 g.

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32. Two particles A and B are in motion. If the wavelength associated with 'A' is 33.33 nm, the wavelength associated with 'B' whose momentum is $\frac{1}{3}^{rd}$ of 'A' is

(A) 2.5×10^{-8} m

(B) 1.0×10^{-8} m

(C) 1.0×10^{-7} m

(D) 1.25×10^{-7} m

33. The first ionization enthalpy of the following elements are in the order :

(A) P < Si < N < C

(B) C < N < Si < P

(C) Si < P < C < N

(D) P < Si < C < N

34. Solubility of AgCl is least in

(A) Pure water

(B) 0.1 M NaCl

(C) 0.1 M $AlCl_3$

(D) 0.1 M $BaCl_2$

35. Which of the following equations does NOT represent Charles's law for a given mass of gas at constant pressure ?

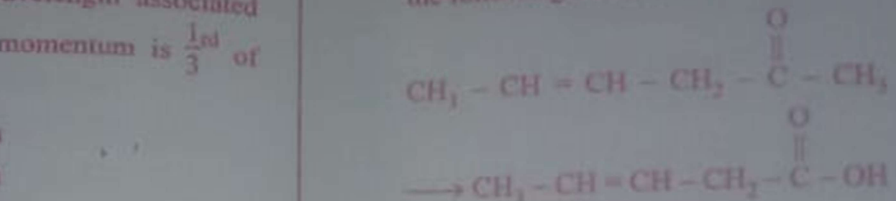
(A) $\log V = \log K + \log T$

(B) $\frac{V}{T} = K$

(C) $\frac{d(\ln V)}{dT} = \frac{1}{T}$

(D) $\log K = \log V + \log T$

36. Which is the most suitable reagent for the following conversion ?



(A) I_2 and NaOH solution

(B) Tollen's reagent

(C) Sn and NaOH solution

(D) Benzoyl peroxide

37. Which of the following is least soluble in water at 298 K ?

(A) $(CH_3)_3N$

(B) CH_3NH_2

(C) $C_6H_5NH_2$

(D) $(CH_3)_2NH$

38. If Aniline is treated with 1 : 1 mixture of con. HNO_3 and con. H_2SO_4, p-nitroaniline and m-nitroaniline are formed nearly in equal amounts. This is due to

(A) protonation of $-NH_2$ which causes deactivation of benzene ring

(B) m-directing property of $-NH_2$ group

(C) isomerization of some p-nitroaniline into m-nitroaniline

(D) m & p directing property of $-NH_2$ group

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39. In nucleic acids, the nucleotides are joined together by
(A) Phosphodiester linkage
(B) Phosphoester linkage
(C) Sulphodiester linkage
(D) Phosphodisulphide linkage

40. Which of the following is generally water insoluble ?
(A) Vitamin-C
(B) Fibrous protein
(C) Glycine
(D) Amylose

41. Relative lowering of vapour pressure of a dilute solution of glucose dissolved in 1 kg of water is 0.002. The molality of the solution is
(A) 0.222
(B) 0.004
(C) 0.021
(D) 0.111

42. One litre solution of $MgCl_2$ is electrolyzed completely by passing a current of 1A for 16 min 5 sec. The original concentration of $MgCl_2$ solution was
(Atomic mass of Mg = 24)
(A) 5×10^{-2} M
(B) 5×10^{-3} M
(C) 1.0×10^{-2} M
(D) 0.5×10^{-3} M

43. An aqueous solution of $CuSO_4$ is subjected to electrolysis using inert electrodes. The pH of the solution will
(A) remains unchanged
(B) increase
(C) increase or decrease depending on the strength of the current.
(D) decrease

44. Give : $E^{\circ}_{Mn^{+3}|Mn^{+2}} = 1.5$ V and $E^{\circ}_{Mn^{+4}|Mn^{+2}} = 1.2$ V, then $E^{\circ}_{Mn^{+3}|Mn^{+4}}$ is
(A) 0.1 V
(B) 0.3 V
(C) 2.1 V
(D) 1.7 V

45. The plot of $t_{1/2}$ v/s $[R]_0$ for a reaction is a straight-line parallel to x-axis. The unit for the rate constant of this reaction is
(A) mol L^{-1} s^{-1}
(B) mol $L^{-1}s$
(C) s^{-1}
(D) L mol^{-1} s^{-1}

46. The metal nitrate that liberates NO_2 on heating
(A) $LiNO_3$
(B) $NaNO_3$
(C) $RbNO_3$
(D) KNO_3

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47. Which of the following is NOT true regarding the usage of hydrogen as a fuel ?

(A) The combustible energy of hydrogen can be directly converted to electrical energy in a fuel cell.

(B) High calorific value

(C) Hydrogen gas can be easily liquefied and stored.

(D) Combustion product is ecofriendly.

48. Resonance effect is not observed in

(A) $CH_2 = CH - C \equiv N$

(B) $CH_2 = CH - CH = CH_2$

(C) $CH_2 = CH - CH_2 - NH_2$

(D) $CH_2 = CH - Cl$

49. 2-butyne is reduced to trans-but-2-ene using

(A) Na in liq. NH_3

(B) $H_2 | Ni$

(C) Zn in dil. HCl

(D) $H_2 | Pd - C$

50. Eutrophication causes

(A) reduction in water pollution

(B) increase of nutrients in water

(C) decreases BOD

(D) reduction in dissolved oxygen

51. Addition of excess of $AgNO_3$ to an aqueous solution of 1 mole of $PdCl_2 \cdot 4NH_3$ gives 2 moles of $AgCl$. The conductivity of this solution corresponds to

(A) 1 : 3 electrolyte

(B) 1 : 1 electrolyte

(C) 1 : 4 electrolyte

(D) 1 : 2 electrolyte

52. The formula of penta aquanitrato chromium (III) nitrate is,

(A) $[Cr(H_2O)_6](NO_2)_2$

(B) $[Cr(H_2O)_6](NO_3)_3$

(C) $[Cr(H_2O)_5NO_2]NO_3$

(D) $[Cr(H_2O)_5NO_3](NO_3)_2$

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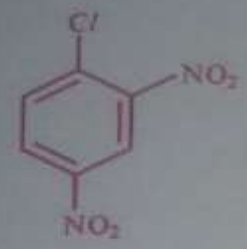
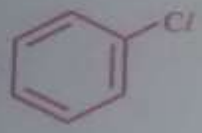
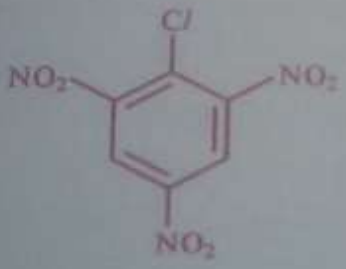
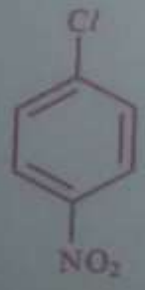
53. Which of the following halide undergoes hydrolysis on warming with water/aqueous NaOH ?

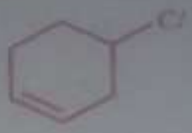
(A) 

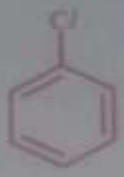
(B) • 

(C) 

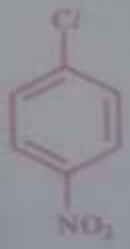
(D) 

54. The compound having longest C – Cl bond is

(A) 

(B) 

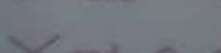
(C)• $CH_2 = CH - Cl$

(D) 

55. The alkyl halides required to prepare  by Wurtz reaction are

(A) 

(B) 

(C) 

(D)• 

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$R-\boxed{X+2Na+X}-R.$

56. Which is a wrong statement ?

(A) $e^{-Ea/RT}$ gives the fraction of reactant molecules that are activated at the given temp

(B) Rate constant k = Arrhenius constant A : if Ea = 0

(C) presence of catalyst will not alter the value of Ea

(D) ln k vs $\frac{1}{T}$ plot is a straight line.

57. 1 L of 2 M CH_3COOH is mixed with 1 L of 3M C_2H_5OH to form an ester. The rate of the reaction with respect to the initial rate when each solution is diluted with an equal volume of water will be

(A) 2 times

(B) 0.25 times

(C) 4 times

(D) 0.5 times

58. Which of the following is an example of homogeneous catalysis ?

(A) oxidation of SO_2 in contact process

(B) oxidation of NH_3 in Ostwald's process

(C) manufacture of NH_3 by Haber's process

(D) oxidation of SO_2 in lead chamber process

59. Critical Micelle concentration for a soap solution is 1.5×10^{-4} mol L^{-1}. Micelle formation is possible only when the concentration of soap solution in mol L^{-1} is

(A) 4.6×10^{-5}

(B) 2.0×10^{-3}

(C) 1.1×10^{-4}

(D) 7.5×10^{-5}

60. Oxidation state of copper is +1 in

(A) Cuprite

(B) Malachite

(C) Chalcopyrite

(D) Azurite

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