SAMPLE PAPER

2019 AIIMS

CHEMISTRY

SET–1

Roll No. | | | | | | | |

General Instructions

(i) This test consists of 60 questions.

(ii) Each question is allotted 1 mark for correct response.

(iii) −1/3 mark will be deducted for indicating incorrect response of each question. No credit will be given for the questions not answered or marked for review .

(iv) The duration of the examination shall be $3\frac{1}{2}$ *hours.*

1. Threshold frequency of a metal is 5×10^{13} s^{-1} upon which 1×10^{14} s^{-1} frequency light is focused. Then the maximum kinetic energy of emitted electron is :
   (a) 3.3×10^{-21}
   (b) 3.3×10^{-20}
   (c) 6.6×10^{-21}
   (d) 6.6×10^{-20}

2. The position of both an electron and helium atom is know within 1.0 nm. The momentum of the electron is know within 5.0×10^{-26} kg ms^{-1}, the minium uncertainty in th measurement of the momentum of the helium atom is:
   (a) 7.0×10^{-26} kg m s^{-1}
   (b) 5.0×10^{-26} kg m s^{-1}
   (c) 8.0×10^{-26} kg m s^{-1}
   (d) 6.0×10^{-26} kg m s^{-1}

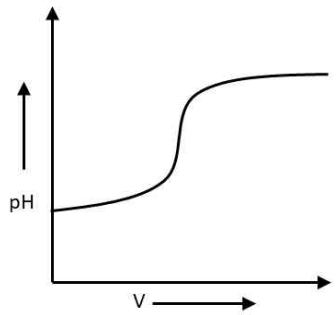
3. The first ionisation enthalpy of Na, Mg and Si are 496, 737, 776, kJ/mol respectively. what will be the first ionistaion enthalpy potential of al in KJ/mol?
   (a) > 766 kJ/mol
   (b) > 496 and < 737 kJ
   (c) > 737 and < 766kJ/mol
   (d) > 496 kJ/mol

4. The molecules having the same hybridization, shape and number of lone pairs of electrons are
   (a) SeF_4, XeO_2F_2
   (b) SF_4, XeF_2
   (c) $XeoF_4$, TeF_4
   (d) $SeCI_4$, XeF_4

5. Which of the following option w.r.t increasing bond order is correct?
   (a) No < C_2 < O_2^- < He_2^+
   (b) C2 < NO < He_2^+ < O_2^-
   (c) He_2^+ < O_2^- < NO < C_2
   (d) He_2^+ < O_2^- < C_2 < NO

6. A mixture of two miscible liquids *A* and *B* is distilled under equilibrium conditions at 1 atm pressure. The mole fraction of A in solution and vapour phase are 0.30 and 0.60 respectively. Assuming ideal behaviour of the solution and the vapour, calculate the ratio of the vapour pressure of pure A to that of pure B:
   (a) 4.0
   (b) 3.5
   (c) 2.5
   (d) 1.85

7. During titration of acetic acid with aq. NaOH solution, the neutralization graph has a vertical line This line indicates:



   (a) Alkaline nature of equivalence
   (b) Acidic nature of equivalence
   (c) Neutral nature of equivalence
   (d) Depends on experimental proceeding

8. Given that $C + O_2 \rightarrow Co_2$; $\Delta H^\circ = -a$ kJ $2CO + O_2 \rightarrow 2CO_2$; $\Delta H^\circ = -b$ kJ:
The heat of formation CO is :
(a) b – 2a
(b) $\frac{2a-b}{2}$
(c) $\frac{b-2a}{2}$
(d) 2a – b

9. The heat liberated when 1.89 g of benzoic acid is burnt in a bomb calorimeter at 25°C and it increases the temperature of 18.94 kg of water by 0.632°C. If the specific heat of water at 25°C is 0.998 cal/g-deg, the value of the heat of combustion of benzoic acid is:
(a) 881.1 kcal
(b) 771.124 kcal
(c) 981.1 kcal
(d) 871.2 kcal

10. An equilibrium mixture of the reaction $2H_2S_{(g)} \rightarrow 2H_{2(g)} + S_{2(g)}$ had 0.5 mole H_2S, 0.10 mole H_2 and 0.4 mole S_2 in one litre vessel. The value of equilibrium constant (K) in mole litre^{-1} is:
(a) 0.016
(b) 0.008
(c) 0.004
(d) 0.160

11. In the reaction $I_2 + I^- \rightarrow I_3-$, The Leuis base is :
(a) I^-2
(b) 1_2
(c) I_3^-
(d) None of these

12. In the reaction : $4Fe + 6O_2 \rightarrow 4Fe^{3+} + 60_2^2$ which of the following statements is incorrect?
(a) Metallic iron is a reducing agent
(b) Fe^{3+} is an oxidising agent
(c) It is a redox reaction
(d) Metallic iron is reduced to Fe^{3+}

13. To a 25ml H_2O_2 solution excess of acidified solution of KI was added. The iodine liberated required 20ml of 0.3 N $Na_2S_2O_3$ Solution:
The volume strength of H_2O_2 solution is
(a) 1.344g/L
(b) 3.244g/L
(c) 5.4g/L
(d) 4.08g/L

14. The correct order of stability of the superoxides is:
    (a) $KO_2 > RbO_2 > CsO_2$
    (b) $KO_2 > CsO_2 > RbO_2$
    (c) $CsO_2 > RbO_2 > KO_2$
    (d) $RbO_2 > CsO_2 > KO_2$

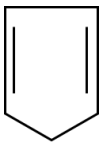
15. The correct order of the increasing ionic character is:
    (a) $BeCl_2 < MgCl_2 < BaCl_2 < CaCl_2$
    (b) $BeCl_2 < MgCl_2 < CaCl_2 < BaCl_2$
    (c) $BeCl_2 < BaCl_2 < MgCl_2 < CaCl_2$
    (d) $BeCl_2 < CaCl_2 < MaCl_2 < BeCl_2$

16. In diborane, the two H – B – H Angles are nearly:
    (a) 60°, 120°
    (b) 95°, 120°
    (c) 95°, 150°
    (d) 120°, 180°

17. The most suitable method for the separation of a 1:1 mixture of ortho and para-nitrophenols is:
    (a) Filtration
    (b) Sublimation
    (c) Crystallisation
    (d) Steam distillation

18. Which of the following alkanes is optically active?
    (a) 3-Methylhexane
    (b) Propane
    (c) 2,3,4-trimethylpentane
    (d) 2-Methylbutane

19. $C_6H_6 \xrightarrow[H_2SO_4]{HNO_3} X \xrightarrow[FeCl_3]{Cl_2} Y$. In the above sequence Y can be
    (a) 3-nitrochlorobenzene
    (b) 1-nitrochlorobenzene
    (c) 4-nitrochlorobenzene
    (d) None of these

20. Which of the following is aromatic?
    (a) 
    (b) 
    (c) 
    (d) 

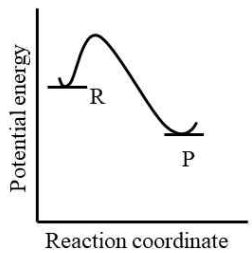
21. Toluene can be oxidised to benzoic acid by:
    (a) H_2SO_4
    (b) $KMnO_4$
    (c) $K_2Cr_2O_7$
    (d) Both (b) and (c)

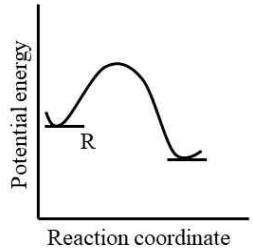
22. Boiling point of benzene is 353.23 K. when 1.8 g of non-volatile solute is dissolved in 90 g of benzene. Then boiling point is raised to 354.11 K_b (benzene)= 2.53 kg mol^{-1} The molecular mass of non-volatile substance is :
    (a) 58 g mol^{-1}
    (b) 120 g mol^{-1}
    (c) 116 g mol^{-1}
    (d) 60 g mol^{-1}

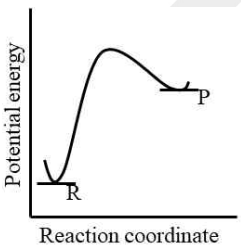
23. For the following concentration cell, to be spontaneous pt(H_2)P_1 atm. | HCl | Pt(H_2) P_2 atm. which of the following is correct?
    (a) $P_1 = P_2$
    (b) $P_1 < P_2$
    (c) $P_1 > P_2$
    (d) Can't be predicted

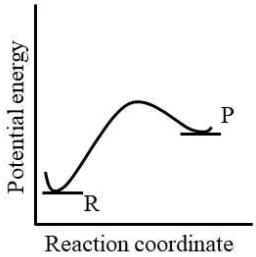
24. The standard oxidation potential E° For the half cell reaction are:
    $Zn \rightarrow Zn^{2+} + 2^{e-}$;E° = + 0.76 V
    $Fe \rightarrow Fe^{2+} + 2^{e-}$;E° = + 0.41 V
    EMF of the cell reaction is
    $Zn + Fe^{2+} \rightarrow Zn^{2+} Fe$
    (a) –0.35 V
    (b) +0.35 V
    (c) 0.17 V
    (d) 1.17 V

25. An endothermic reaction with high activation energy for the forward reaction is given by the diagram:

(a)


(b)


(c)


(d)


26. Lithopone, a white pigment, consists of :
    (a) ZnS and $BaSO_4$
    (b) PbS and MgO
    (c) AI_2O_4 and $CaCO_3$
    (d) $BaSO_4$ and $PbSO_4$

27. Which of the following statement is not true for hydrolysis of XeF_6 ?
    (a) $XeOF_4$ is formed
    (b) Xeo_2F_2 IS formed
    (c) It is a redox reaction
    (d) XeO_3 is formed

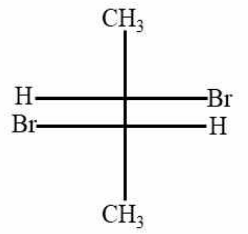
28. Which of the following is arranged in the increasing order of enthalpy of vaporization :
    (a) NH_3, PH_3, AsH_3
    (b) AsH_3, PH_3, NH_3
    (c) NH_3, AsH_3, PH_3
    (d) PH_3, AsH_3, NH_3

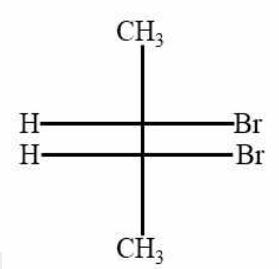
29. Philosopher's wool when heated with BaO at 1100°C gives a compound identify the compound :
    (a) $BaZnO_2$
    (b) Ba + ZnO_2
    (c) $BaCdO_2$
    (d) BaO_2 + Zn

30. $[CoCl_2(NH_3)_4]^+ + Cl^- \rightarrow [CoCl_2(NH_3)_3] + NH_3]$ In the reaction only one isomer of complex product is obtained. The initial complex is
    (a) Cis isomer
    (b) Trans isomer
    (c) Not having stereoisomers
    (d) Either cis or trans

31. The correct order for the wavelength of absorption in the visible region is :
    (a) $[Ni(NO_2)_6]^{4-} < [Ni(NH_3)_6]^{2+} < [Ni(H_2O)_6]^{2+}$
    (b) $[NI(NO_2)_6]^{4-} < [Ni(H_2O)_6]^{2+} < [Ni(NH_3)_6]^{2+}$
    (c) $[Ni(NO_2)_6]^{4+} < [Ni(H_2O)_6]^{2+} < [Ni(NH_3)_6]^{2+}$
    (d) $[Ni(NH_3)]^{2+} < [Ni(H_2O) + < Ni(Noa)_6]^{4-}$

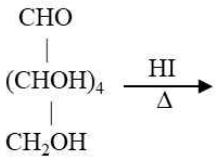
32. Wheat trans-2 butene is reacted with Br_2 than product formed is:

(a) 

(b) 

(c) Meso compounds

(d) Both b and c

33. 

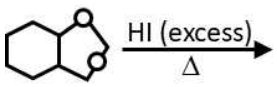
? (Major product will be):

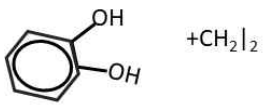
(a) n-pentane

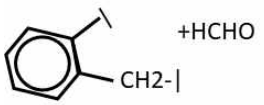
(b) iso panxane

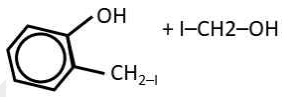
(c) n-hexane

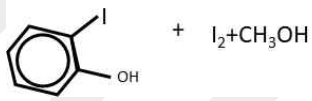
(d) n-octane

34. 

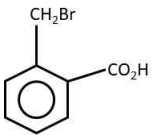
(a) 

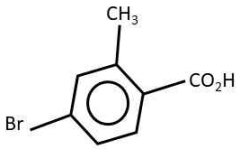
(b) 

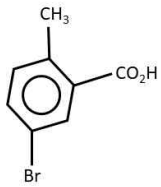
(c) 

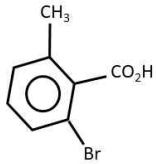
(d) 

35. o-Toluic acid on reaction with Br_2+Fe gives:

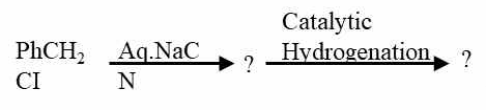
(a) 

(b) 

(c) 

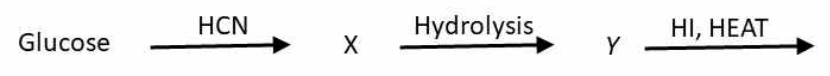
(d) 

36. In a reaction of C_6H_5Y, the major product (>60%)is m-isomer, The group Y is
(a) –C1
(b) –OH
(c) $–NH_2$
(d) –COOH

37. 

(u) The final product (u) is :

(a) $C_6H_5CH_2CH_2NH_2$
(b) $C_6H_5CH_2CONH_2$
(c) $C_6H_5CH_2NH_2$
(d) $C_6H_5–CH_2–NHCH_3$

38. 

is :

(a) Heptanoic acid
(b) 2–iodohexane
(c) Heptane
(d) Heptanol

39. Enzymes with two sites are called :
(a) Apoenzyme
(b) Allosteric
(c) Holoenzyme
(d) Conjugate enzyme

40. The chemical name for melamine is :
(a) 1,2,5 – Triamino – 2,4,6 – triazine
(b) 2,4,6 – Triamino – 1,3,5 – triazine
(c) 2–Amino – 1,3,5 – triazine
(d) 2 – Diamino – 1,3,5 – triazine

Direction : From Q no. 41 to Q no. 60 has a statements of assertion (A) is given followed by a corresponding statement of reason (R). Mark the correct answer.

(a) If both Assertion & reason are True & the reason is a correct explanation of the assertion.
(b) If both assertion & reason are true but reason is not a correct explanation of the Assertion.
(c) If Assertion is True but the reason is false.
(d) **If both Assertion & Reason are False.**

41. **Assertion** : The micelle formed by sodium stearate in water has –COO-group at the surface.
Reason : surface tension of water is reduced by the addition of stearate (Soap)

42. **Assertion :** Compressibility factor for hydrogen varies with pressure with positive slope at all pressures.
Reason : Even at low pressures, repulsive forces dominate hydrogen gas.

43. **Assertion :** Disproportionation of Se_2Cl_2 gives Se and $SeCl_2$.
Reason : $SeCl_4$ is highly unstable.

44. **Assertion :** In high spin situation configuration of d^5 ions will be $t^3_{2g}\ e^2_g$.
Reason : In high spin situation, pairing energy is less than crystal field energy.

45. **Assertion** : Neutrons penetrate matter more readily as compared to protons.
Reason : Neutrons are slightly more massive than protons.

46. **Assertion :** Cis –2–butene given meso-2, 3-butandiol with dilute alkaline. $KMnO_4$ Solution.
Reason : Dilute alkaline $KMnO_4$ solution given trans addition with alkenes.

47. **Assertion** : The presence of nitro group facilitates nucleophilic substitution reactions is aryl halides.
Reason : The intermediate carbanion is stabilized due to presence of nitro group.

48. **Assertion** : In a mixture of Cd(II) and Cu(II), Cd^{2+} gets precipitated in presence of KCN by H_2S.
Reason : The stability constant of $[Cu(CN)_4]^{3-}$ is greater than $[Cd(CN)_4]^{2-}$.

49. **Assertion** : with decrease in activation energy, rate of reaction increases.
Reason : rate of reaction increases with increase in collision between molecules of reactants.

50. **Assertion** : Coagulation power of $A1^{3+}$ is more than Na^+
Reason : Greater the valency of the flocculating ion added, greater is its power to cause precipitation (Hardy-Schulze rule).

51. **Assertion** : The presence of a large number of schottky defects in NaCl, lower its density
Reason : In NaCl, there are approximately 10^6 Schottky pairs per cm^3 at room temperature.

52. **Assertion :** The dume's method is more applicable to nitrogen containing organic compounds than the kjeldahi's method.
Reason : The khedahi's method does not given satisfactory results for compound in which nitrogen is directly linked to oxygen.

53. **Assertion** : Silicones are hydrogen in nature
Reason : Si-O-Si linkages are moisture sensitive.

54. **Assertion** : according to Le-chatelier's principle addition of heat to an equilibrium solid = liquid results in decrease in the amount of solid.
Reason : Reaction is endothermic, so on heating forward reaction is favoured.

55. **Assertion** : Barium is not required for normal biological function in human.
Reason : Barium does not show variable oxidation state.

56. **Assertion** : Many endothermic reaction that are not spontaneous at room temperature become spontaneous at high temperature.
Reason : Entropy of the system increases with increases in temperature.

57. **Assertion** : CIF_3 has T-shape structure.
Reason : It has two lone pair arrange at 180° angle.

58. **Assertion** : SiF_6^{2-} is known but $SiCl_2^-$ is not.
Reason : Size of fluorine is small and its lone pair of electrons interacts with d-orbitals of si strongly.

59. **Assertion**: Electrons are ejected from a certain mental when higher blue of violet light strike the metal surface. however, only violet light causes electron ejection from a second metal.
Reason: The electrons in the first mental require less energy for ejection.

60. **Assertion**: The quantized energy of an electron is largely determined by its principal quantum number.
Reason: The principal quantum number n is a measure of the most probable distance of finding the electron around the nucleus.