IIT-JEE-Chemistry-Screening–2001

Screening

Time : Two hours Max. Marks : 100

Instructions
Use the values of the constants as given below:
Planck's constant, h = 6.626 x 10-34 Js
Atomic Numbers: Cr = 24, Mn =25, Fe = 26, Co=27, Pt=78

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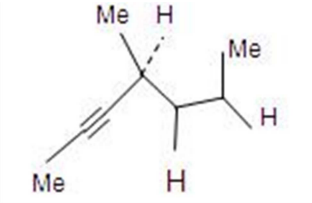
1. In thermodynamics, a process is called reversible when:
(a) Surroundings and system change into each other
(b) There is no boundary between system and surroundings
(c) The surroundings are always in equilibrium with the system
(d) The system changes into the surroundings spontaneously

2. The root mean square velocity of an ideal gas at constant pressure varies with density
(d) as :
(a) d2
(b) d
(c) √d
(d) 1/√d

3. In a solid 'AB' having the NaCl structure, 'A' atoms occupy the corners of the cubic unit cell. If all the face-centered atoms along one of the axes are removed, then the resultant stoichiometry of the solid is:
(a) AB2
(b) A2B
(c) A4B3
(d) A3B4

4. The wavelength associated with a golf ball weighing 200g and moving at a speed of 5 m/h is of the order :
(a) 10-10m
(c) 10-20m
(d) 10-30m
(e) 10-40m

5. Hydrogenation of the adjoining compound in the presence of poisoned palladium catalyst gives :



(a) An optically active compound
(b) An optically inactive compound
(c) A racemic mixture
(d) A diastereomeric mixture

6. 1-Propanol and 2-Propanol can be best distinguished by :
(a) Oxidation with alkaline KMnO4 followed by reaction with Fehling solution
(b) Oxidation with acidic dichromate followed by reaction with Fehling solution
(c) Oxidation by heating with copper followed by reaction with Fehling solution
(d) Oxidation with concentrated H2SO4 followed by reaction with Fehling solution

7. The reaction of propene with HOCl proceeds via the addition of :
(a) H+ in the first step
(b) Cl+ in the first step
(c) OH- in the first step
(d) Cl+ and OH- single step

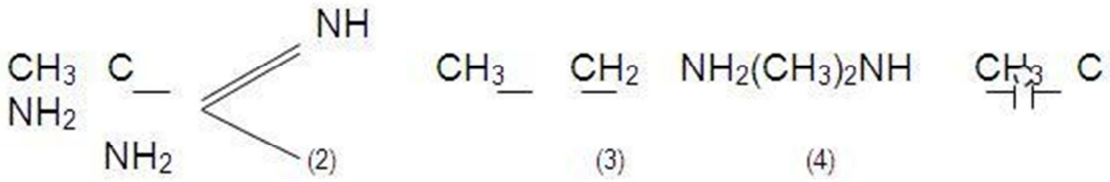
8. An SN2 reaction at an asymmetric carbon of a compound always gives :
(a) An enantiomer of the substrate
(b) A product with opposite optical rotation
(c) A mixture of diastereomers
(d) A single steroisomer

9. The quantum numbers +1/2 and -1/2 for the electron spin represent :
(a) Rotation of the electron in clockwise and anticlockwise direction respectively
(b) Rotation of the electron in anticlockwise and clockwise direction respectively
(c) Magnetic moment of the electron pointing up and down respectively
(d) Two quantum mechanical spin states which have no classical analogue

10. Which one of the following statements is false :
(a) Work is state function
(b) Temperature is a state function
(c) Change in the state is completely defined when the initial and final stated are specified
(d) Work appears at the boundary of the system

11. An aqueous solution of 6.3 g oxalic acid dehydrate is made up to 250ml> the volume of 0.1N NaOH required to completely neutralize 10ml of this solution is :
(a) 40ml
(b) 20ml
(c) 10ml
(d) 4ml

12. The correct order of basicities of the following compounds is :



(a) 2>1>3>4
(b) 1>3>2>4
(c) 3>1>2>4
(d) 1>2>3>4

13. The number of isomers for the compound with molecular formula C2 BrClFI is:
(a) 3
(b) 4
(c) 5
(d) 6

14. In the presence of peroxide, hydrogen chloride and hydrogen iodide do not give anti-Markovnikov addition to alkenes because :
(a) Both are highly ionic
(b) One is oxidising and the other is reducing
(c) One of the steps is endothermic in both the cases
(d) All the steps are exothermic in both the cases

15. The compound that will react most readily with NaOH to form methanol is :
(a) (CH3)4 N+ I-

(b) CH3 OCH3
(c) (CH3)3 S+ I-

(d) (CH3)3 Cl

16. A mixture of benzaldehyde and formaldehyde on heating with aqueous NaOH solution gives :
(a) Benzyl alcohol and sodium formate
(b) Sodium benzoate and methyl alcohol
(c) Sodium benzoate and sodium formate
(d) Benzyl alcohol and methyl alcohol

17. The correct order of equivalent conductance at infinite dilution of LiCl,NaCl and KCl is:
(a) LiCl>NaCl> KCl
(b) KCl>NaCl> LiCl
(c) NaCl>KCl>LiCl
(d) LiCl>KCl>NaCl

18. At constant temperature, the equilibrium constant (KP) for the decomposition reaction N2 O4 2NO2 is expressed by KP=4x2 P/(1-x2), where P= pressure,

x = extent of decomposition. Which one of the following statements is true:
(a) KP increases with increase of P
(b) KP increases with increase of x
(c) KP increases with decrease of x
(d) KP remains constant with change in P and x

19. If 'I' is the intensity of absorbed light and 'C' is the concentration of AB for the photochemical process AB+hv → AB* , the rate of formation of AB* is directly proportional to :
(a) C
(b) I
(c) I2
(d) C.I

20. Saturated solution of KNO3 is used to make 'salt-bridge' because :
(a) Velocity of K+ is greater than that of NO3-
(b) Velocity of NO3-is greater than that of K+
(c) Velocities of both K+and NO3-are nearly the same
(d) KNO3 is highly soluble in water.

21. For a sparingly soluble salt APBq , the relationship of its solubility product (LS) with its solubility (S) is :
(a) LS=S(p+q).pp.qq
(b) LS=S(p+q).pq.qp
(c) LS=Spq.pp.qq
(d) LS=Spq.p.q(p+q)

22. The correct order of acidity is :
(a) HClO < HClO2 < HClO3 < HClO4
(b) HClO4 < HClO3 < HClO2 < HCLO
(c) HClO < HClO4 < HClO3 < HClO2
(d) HClO4 < HClO2 < HClO3 < HClO

23. The reaction, $3ClO^{-}_{(aq)} \rightarrow ClO_3^{-}{}_{(aq)} + 2Cl^{-}_{(aq)}$ is an example of :
(a) Oxidation reaction
(b) Reduction reaction
(c) Disproportionate reaction
(d) Decomposition reaction

24. The number of s-s bonds in sulphur trioxide timer (S3O9) is :
(a) Three

(b) Two
(c) One
(d) Zero

25. The common features among the species CN-, CO and NO+ are :
(a) Bond order three and isoelectronic
(b) Bond order three and weak field ligands
(c) Bond order two and acceptors
(d) Isoelectronic and weak field ligands.

26. The chemical composition of 'slag' formed during the smelting process in the extraction of copper is :
(a) Cu2O + FeS
(b) FeSiO3
(c) CuFeS2
(d) Cu2S + FeO

27. In the standardization of Na2S2O3 using K2Cr2O7 by iodometry, the equivalent weight of K2Cr2O7 is:
(a) (molecular weight)/2
(b) (molecular weight)/6
(c) (molecular weight)/3
(d) Same as molecular weight

28. The complex ion which has no 'd' electrons in the central metal atom is :
(a) [MnO4]-
(b) [Co(NH3)6]3+
(c) [Fe(CN)6]3-
(d) [Cr(H2O)6]3+

29. The set representing the correct order of first ionization potential is :
(a) K>Na>Li
(b) Be>Mg>Ca
(c) B>C>N
(d) Ge>Si>C

30. The correct order of hybridization of the central atom in the following species NH3, [PtCl4]2-, PCl5 and BCl3 is:

(a) dsp2,dsp3,sp2 and sp3
(b) sp3,dsp2,dsp3,sp2
(c) dsp2,sp2,sp3,dsp3
(d) dsp2,sp3,sp2,dsp3

The questions below (31-35) consist of an '**Assertion**' in column 1 and the '**Reason**' in column 2. Use the following key to choose the appropriate answer.
(a) If both assertion and reason are CORRECT, and reason is the CORRECT explanation of the assertion.
(b) If both assertion and reason are CORRECT, but reason is NOT the CORRECT explanation of the assertion.
(c) If assertion is CORRECT, but reason is INCORRECT.
(d) If assertion is INCORRECT, but reason is CORRECT.

Assertion (column 1)	**Reason (column 2)**
31. Dimethylsulphide is commonly used for the reduction of an ozonide of an alkene to get the carbonyl compounds.	It reduces the ozonide giving water soluble dimethyl sulphoxide and excess of it evaporates.
32. Addition of bromine to trans-2-butene yields meso-2, 3-dibromobutane.	Bromine addition to an alkene is an electrophilic addition.
33. Between SiCl4 and CCl4, only SiCl4 reacts with water.	SiCl4 is ionic and CCl4 is covalent.
34. strongly acidic solutions, aniline becomes more reactive towards electrophilic reagents.	The amino group being completely protonated in strongly acidic solution, the lone pair of electrons of the nitrogen is no longer available for resonance.
35. In any ionic solid (MX) with Schottky defects, the number of positive and negative ions are same.	Equal numbers of cation and anion vacancies are present.