IIT-JEE-Chemistry-Screening–2000

SCREENING

Time : Three hours Max. Marks : 100

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1. For the electrochemical cell, M|M+||X–|X, Eo (M+|M) = 0.44V and Eo (X|X–) = 0.33 V. From this data one can deduce that:
(A) M + X ® M+ + X– is the spontaneous reaction.
(B) M+ + X– ® M + X is the spontaneous reaction.
(C) Ecell = 0.77V
(D) Ecell = –0.7 V

2. The DfHo for CO2(g), CO(g) and H2O(g) are –393.5, –110.5 and –241.8 kJ mol–1respectively. The standard enthalpy change (in kJ mol–1) for the reaction CO2(g) + H2(g) ® CO(g) + H2O(g) is:

(A) 524.1 (B) 41.2
(C) –262.5 (D) –41.2

3. The number of P — O — P bonds in cyclic metaphosphoric acid is:
(A) zero (B) two
(C) three (D) four

4. The chemical processes in the production of steel from haematite ore involve:
(A) reduction
(B) oxidation
(C) reduction followed by oxidation
(D) oxidation followed by reduction

5. Which of the following has the highest nucleophilicity:
(A) F– (B) OH–
(C) CH3- (D) NH2-

6. The order of reactivities of the following alkyl halides for a SN2 reaction is:
(A) RF > RCI > RBr > RI (B) RF > RBr > RCI > RI
(C) RCI > RBr > RF > RI (D) RI > RBr > RCI > therefore

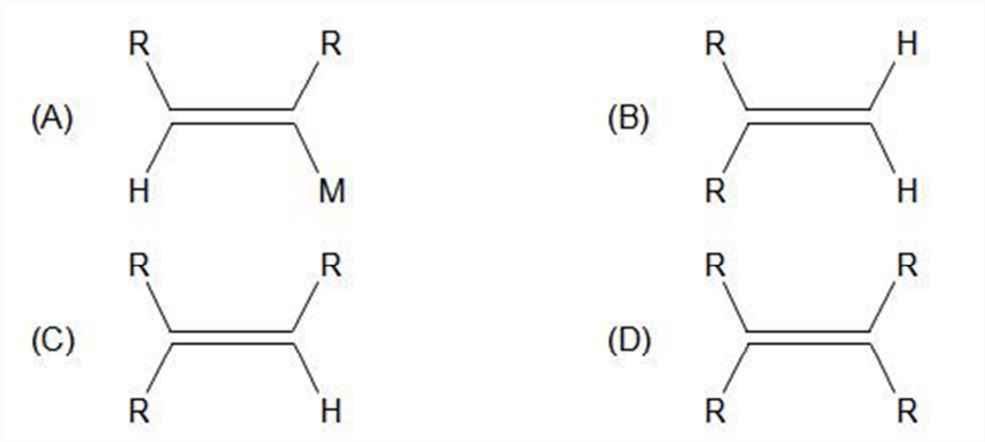
7. The electronic configuration of an element is 1s2 2s2 2p6 3s2 3p6 3d5 4s1. This represents its:
(A) excited state (B) ground state
(C) cationic form (D) anionic form

8. The correct order of acidic strength is:
(A) CI2O7> SO2 > P4O10 (B) CO2 > N2O5> SO3
(C) Na2O > MgO > AI2O3 (D) K2O > CaO > MgO

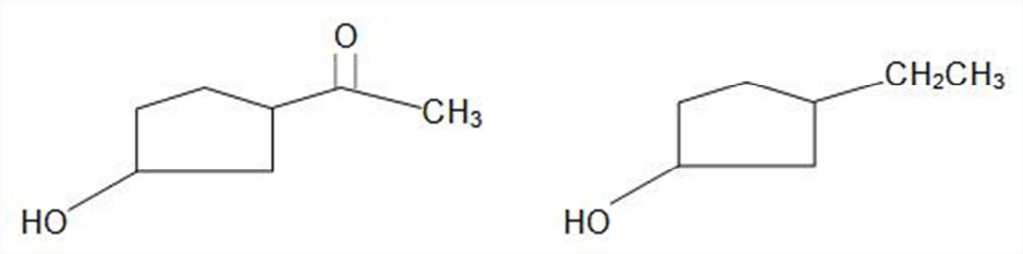
9. Which of the following, has the most acidic hydrogen:
(A) 3–hexanone (B) 2, 4-hexanedione
(C) 2, 5-hexanedione (D) 2, 3-hexanedione

10. Benzoyl chloride is prepared from benzoic acid by:
(A) CI2, hv (B) SO2CI2
(C) SOCI2 (D) CI2, H2O

11. Which one of the following alkenes will react fastest with H2 under catalytic hydrogenation condition :



12. The appropriate reagent for the following transformation :



(A) Zn(Hg), HCI (B) NH2 NH2, OH–
(C) H2/Ni (D) NaBH4

13. Electrolytic reduction of alumina to aluminium by Hall-Heroult process is carried out:
(A) in the presence of NaCI.
(B) in the presence of fluorite.
(C) in the presence of cryolite which forms a melt with lower melting temperature.
(D) in the presence of cryolite which forms a melt with higher melting temperature.

14. Amongst the following, identify the species with an atom in +6 oxidation state.
(A) MnO4- (B) Cr(CN)63-

(C) NiF62- (D) CrO2CI2

15. For the reversible reaction N2(g) + 3H2(g) = 2NH3(g) at 500oC, the value of Kp is 1.44 × 10-5 when partial pressure is measured in atmospheres. The corresponding value of Kc with concentration in mol L-1 is:
(A) 1.44 × 10-5/(0,082 × 500)-2 (B) 1.44 × 10-5/(8.314 × 773)-2
(C) 1.44 × 10-5/(0.082 × 773)2 (D) 1.44 × 10-5/(0.082 × 773)-2

16. The hybridization of atomic orbitals of nitrogen in NO2+, NO3- and NH4+ are:

(A) sp, sp3 and sp2 respectively (B) sp, sp2 and sp3 respectively
(C) sp2, sp and sp3 respectively (D) sp2, sp3 and sp respectively

17. Amongst H2O, H2S, H2Se and H2Te, the one with the highest boiling point is:
(A) H2O because of hydrogen bonding
(B) H2Te because of higher molecular weight
(C) H2S because of hydrogen bonding
(D) H2Se because of lower molecular weight

18. Which of the following compounds will exhibit geometrical isomerism:
(A) 1-phenyl-2-butene (B) 3-phenyl-1-butene
(C) 2-phenyl-1-butene (D) 1, 1-diphenyl-1-propene

19. Molecular shapes of SF4, CF4 and XeF4 are:
(A) the same, with 2, 0 and 1 lone pair of electrons respectively
(B) the same, with 1, 1 and 1 lone pair of electrons respectively
(C) different, with 0, 1 and 2 lone pairs of electrons respectively
(D) different, with 1, 0 and 2 lone pairs of electrons respectively

20. Among the following, the strongest base is:
(A) C6H5NH2 (B) *p* – NO2C6H4NH2
(C) m – NO2 – C6H4NH2 (D) C6H5CH2NH2

21. The correct order of radii is:
(A) N < Be < B (B) F– < O2– < N3–
(C) Na < Li < K (D) Fe3+ < Fe2+ < Fe4+

22. The number of nodal planes in a px orbital is:
(A) one (B) two
(C) three (D) zero

23. Ammonia can be dried by:
(A) conc. H2SO4 (B) P4O10
(C) CaO (D) anhydrous CaCI2

24. The rms velocity of hydrogen is √7 times the rms velocity of nitrogen. If T is the temperature of the gas:
(A) T (H2) = T (N2) (B) T (H2) > T (N2)
(C) T (H2) < T (N2) (D) T (H2) = √7 T (N2)

25. Propyne and propene can be distinguished by:
(A) conc. H_2SO_4 (B) Br_2 in CCl_4
(C) dil. $KMnO_4$ (D) $AgNO_3$ in ammonia

26. Which one of the following will most readily be dehydrated in acidic condition:

27. The compressibility of a gas is less than unity at STP. Therefore :
(A) Vm > 22.4 litres (B) Vm < 22.4 litres
(C) Vm = 22.4 litres (D) Vm = 44.8 litres

28. The rate constant for the reaction, $2N_2O_5 \rightarrow 4NO_2 + O_2$ is $3.0 \times 10^{-5}\ s^{-1}$. If the rate is 2.40×10^{-5} mol $L^{-1}\ s^{-1}$, then the concentration of N_2O_5 (in mol L^{-1}) is :
(A) 1.4 (B) 1.2
(C) 0.04 (D) 0.8

29. At 100oC and 1 am if the density of the liquid water is 1.0g cm^{-3} and that of water vapour is 0.0006 g cm^{-3}, then the volume occupied by water molecules in1 litre of steam at this temperature is:
(A) 6 cm^3 (B) 60 cm^3
(C) 0.6 cm^3 (D) 0.06 cm^3

30. When two reactants, A and B are mixed to give products C and D, the reaction quotient, Q, at the initial stages of the reaction :
(A) is zero (B) decreases with time
(C) is independent of time (D) increases with time

The questions below consist of an '**Assertion**' in column I and the '**Reason**' in column 2. Use of 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		**Reason**
31.	1-Butene on reaction with HBr in the presence of a peroxide produces 1-bromobutane	It involves the formation of primary radical.
32.	The first ionization energy of Be is greater than that of B.	2p orbital is lower in energy than 2s.
33.	The pressure of a fixed amount of an	Frequency of collisions and their impact both

	ideal gas is proportional to its temperature	increase in proportion to the square root of temperature.
34.	Phenol is more reactive than benzene towards electrophilic substitution reaction	In the case of phenol, the intermediate carbocation is more resonance stabilized.
35.	The heat absorbed during the isothermal expansion of an ideal gas against vacuum is zero	The volume occupied by the molecules of an ideal gas is zero.