**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 ΔfHo for CO2(g), CO(g) and H2O(g) are –393.5, –110.5 and –241.8 kJ mol–1 respectively. 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. H2SO4                          (B) Br2 in CCI4
(C) dil. KMnO4                             (D) AgNO3 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, 2N2O5 → 4NO2 + O2 is 3.0 × 10–5 s–1. If the rate is 2.40 × 10–5 mol L–1 s–1, then the concentration of N2O5 (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 cm3                                        (B) 60 cm3
(C) 0.6 cm3                                     (D) 0.06 cm3

**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.

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| **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 ideal gas is proportional to its temperature | Frequency of collisions and their impact both 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. |