

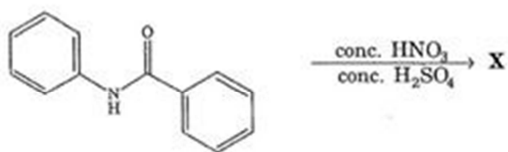
# IIT-JEE-Chemistry-Paper1-2007

## Paper 1

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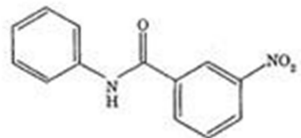
1. The species having bond order different from that in CO is
  - (A)  $\text{NO}^-$
  - (B)  $\text{NO}^+$
  - (C)  $\text{CN}^-$
  - (D)  $\text{N}^2$
  
2. Among the following, the paramagnetic compound is
  - (A)  $\text{Na}_2\text{O}_2$
  - (B)  $\text{O}_3$
  - (C)  $\text{N}_2\text{O}$
  - (D)  $\text{KO}_2$
  
3. Extraction of zinc from zinc blende is achieved by
  - (A) electrolytic reduction
  - (B) roasting followed by reduction with carbon
  - (C) roasting followed by reduction with another meal
  - (D) roasting followed by self-reduction

4. In the following reaction,

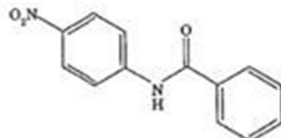


The structure of the major product 'X' is

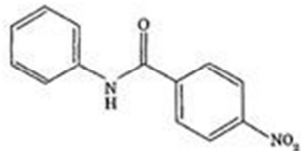
(A)



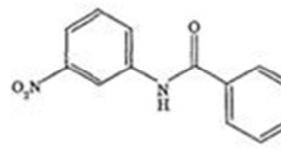
(B)



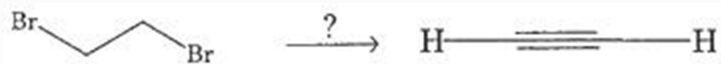
(C)



(D)



5. The reagent(s) for the following conversion,



is/are

- (A) alcoholic KOH
  - (B) alcoholic KOH followed by  $\text{NaNH}_2$
  - (C) aqueous KOH followed by  $\text{NaNH}_2$
  - (D)  $\text{Zn}/\text{CH}_3\text{OH}$
6. The number of structural isomers for  $\text{C}_6\text{H}_{14}$  is
- (A) 3
  - (B) 4

(C) 5

(D) 6

7. The percentage of p-character in the orbitals forming P-P bonds in  $P_4$  is

(A) 25

(B) 33

(C) 50

(D) 75

8. When 20g of naphthoic acid ( $C_{11}H_8O_2$ ) is dissolved in 50 g of benzene ( $K_f = 1.72 \text{ K kg mol}^{-1}$ ), a freezing point depression of 2K is observed. The van't Hoff factor (i) is

(A) 0.5

(B) 1

(C) 2

(D) 3

9. The value of  $\log_{10}K$  for a reaction  $A \rightleftharpoons B$  is

(Given :  $\Delta_r H^\circ = -54.07 \text{ kJ mol}^{-1}$ ,  $\Delta_r S^\circ = 10 \text{ JK}^{-1} \text{ mol}^{-1}$  and  $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ ;  $2.303 \times 8.314 \times 298 = 5705$ )

(A) 5

(B) 10

(C) 95

(D) 100

10. **STATEMENT-1**

Boron always forms covalent bond

Because

**STATEMENT-2**

The small size of  $B^{3+}$  favours formation of covalent bond.

- (A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.
- (B) Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for statement-1.
- (C) Statement-1 is True, Statement-2 is False
- (D) Statement-1 is False, Statement-2 is True

**11. STATEMENT-1**

In water, orthoboric acid behaves as a weak monobasic acid.

Because

**STATEMENT-2**

In water, orthoboric acid acts as a proton donor.

- (A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.
- (B) Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for statement-1.
- (C) Statement-1 is True, Statement-2 is False
- (D) Statement-1 is False, Statement-2 is True

**12. STATEMENT-1**

p-Hydroxybenzoic acid has a lower boiling point than o-hydroxybenzoic acid.

Because

**STATEMENT-2**

o-Hydroxybenzoic acid has intramolecular hydrogen bonding.

- (A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.
- (B) Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for statement-1.
- (C) Statement-1 is True, Statement-2 is False
- (D) Statement-1 is False, Statement-2 is True

**13. STATEMENT-1**

Micelles are formed by surfactant molecules above the critical micellar concentration (CMC).

Because

**STATEMENT-2**

The conductivity of a solution having surfactant molecules decreases sharply at the CMC.

- (A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.
- (B) Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for statement-1.
- (C) Statement-1 is True, Statement-2 is False
- (D) Statement-1 is False, Statement-2 is True

**14.** Argon is used in arc welding because of its

- (A) low reactivity with metal
- (B) ability to lower the melting point of metal

- (C) flammability
- (D) high calorific value

**15.** The structure of  $\text{XeO}_3$  is

- (A) linear
- (B) planar
- (C) pyramidal
- (D) T-shaped

**16.**  $\text{XeF}_4$  and  $\text{XeF}_6$  are expected to be

- (A) oxidizing
- (B) reducing
- (C) unreactive
- (D) strongly basic

### Paragraph

Chemical reactions involve interaction of atoms and molecules. A large number of atoms/molecules (approximately  $6.023 \times 10^{23}$ ) are present in a few grams of any chemical compound varying with their atomic/molecular masses. To handle such large numbers conveniently, the mole concept was introduced. This concept has implications in diverse areas such as analytical chemistry, biochemistry, electrochemistry and radiochemistry. The following example illustrates a typical case, involving chemical/electrochemical reaction, which requires a clear understanding of the mole concept.

A 4.0 molar aqueous solution of NaCl is prepared and 500 mL of this solution is electrolysed. This leads to the evolution of chlorine gas at one of the electrodes (atomic mass: Na = 23, Hg = 200; 1 Faraday = 96500 coulombs).

**17.** The total number of moles of chlorine gas evolved is

- (A) 0.5
- (B) 1.0
- (C) 2.0
- (D) 3.0

**18.** If the cathode is a Hg electrode, the maximum weight (g) of amalgam formed from this solution is

- (A) 200
- (B) 225
- (C) 400
- (D) 446

**19.** The total charge (coulombs required for complete electrolysis is

- (A) 24125
- (B) 48250
- (C) 96500
- (D) 19300

**20.** Match the complexes in Column I with their properties listed in Column II.

Column I		Column II	
(A)	$[\text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})_2]\text{Cl}_2$	(p)	geometrical isomers
(B)	$[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$	(q)	paramagnetic
(C)	$[\text{Co}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}$	(r)	diamagnetic
(D)	$[\text{Ni}(\text{H}_2\text{O})_6]\text{Cl}_2$	(s)	metal ion with +2 oxidation state

**21.** Match the chemical substances in Column I with type of polymers/type of bonds in Column II.

Column I		Column II	
(A)	Cellulose	(p)	Natural polymers
(B)	Nylon-6, 6	(q)	Synthetic polymer
(C)	Protein	(r)	Amide linkage
(D)	Sucrose	(s)	Glycoside linkage

**22.** match gases under specified conditions listed in Column I with the properties/laws in Column II.

Column I		Column II	
(A)	Hydrogen gas (P=200 atm, T=273 K)	(p)	Compressibility factor $\neq 1$
(B)	Hydrogen gas (P $\sim$ 0, T=273 K)	(q)	Attractive forces are dominant
(C)	CO <sub>2</sub> (P = 1 atm, T = 273 K)	(r)	PV = nRT
(D)	Real gas with very large molar volume	(s)	P(V - nb) = nRT