

PART II : CHEMISTRY

SECTION - I

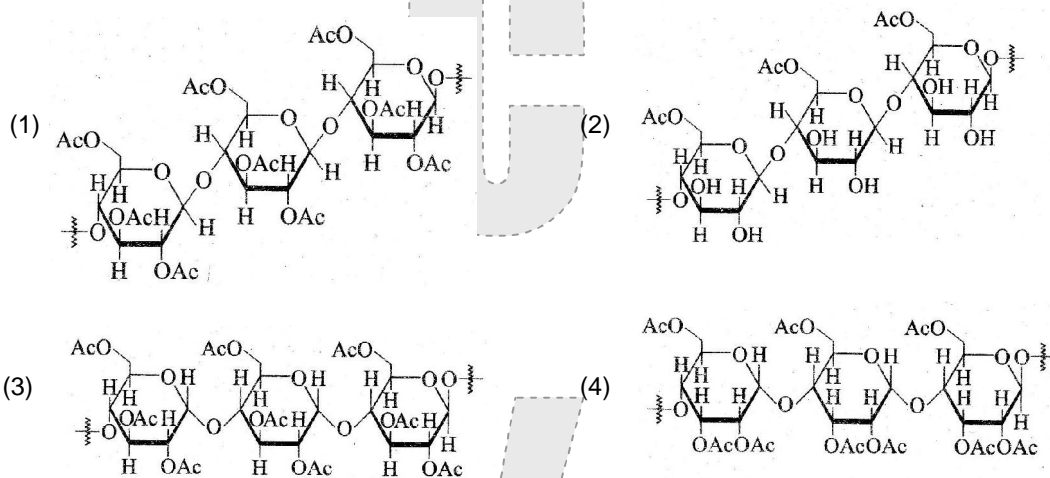
Single Correct Choice Type

This section contains 8 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** is correct.

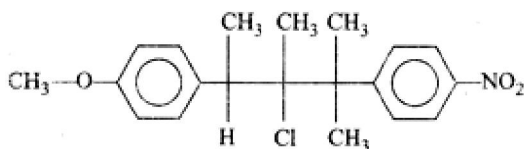
21. What is the weight of the residue obtained on strongly heating 2.76 g of silver carbonate?
 (1) 2.16 g (2) 2.32 g (3) 2.48 g (4) 2.64 g
22. 100 g of benzene ($k_f = 1.72 \text{ K kg mol}^{-1}$) is taken in a beaker. When 40 g of naphthoic acid ($\text{C}_{11}\text{H}_8\text{O}_2$) is dissolved in it, a freezing point depression of 2 K is observed. What is the Van't Hoff factor (i)?
 (1) 0.5 (2) 1 (3) 2 (4) 3
23. Consider a first order reaction,
 (A) \rightarrow product
 Initial concentration of A is 0.1 M. After 40 min, the concentration of A changes to 0.025 M. What is the rate of reaction of A when the concentration of A is 0.01 M.
 (1) $1.73 \times 10^{-5} \text{ M min}^{-1}$ (2) $2.43 \times 10^{-5} \text{ M min}^{-1}$
 (3) $4.37 \times 10^{-4} \text{ M min}^{-1}$ (4) $3.47 \times 10^{-4} \text{ M min}^{-1}$
24. Consider the following reaction



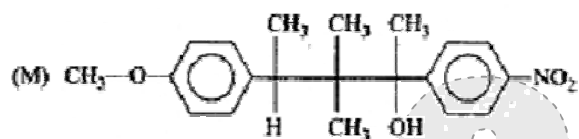
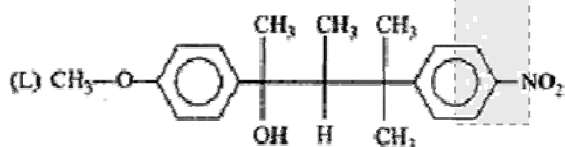
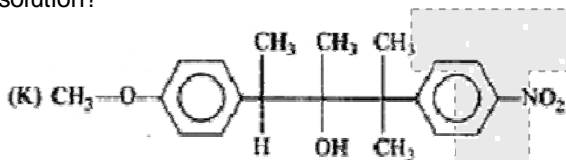
What is the structure of the product formed in this reaction?



25.



Which of the following compounds is obtained on the hydrolysis of the above compound in aqueous solution?



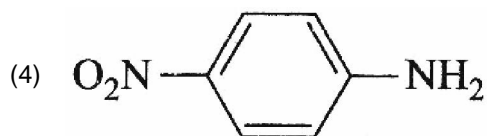
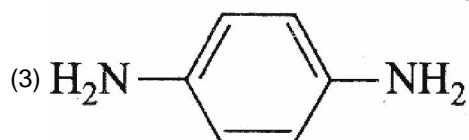
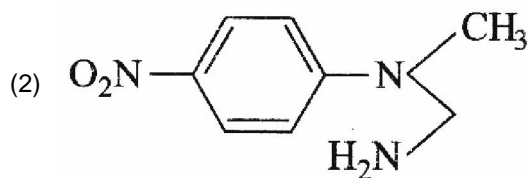
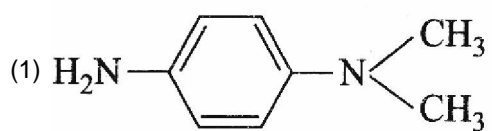
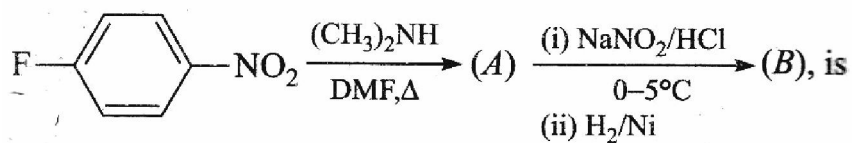
(1) only (K)

(3) only (M)

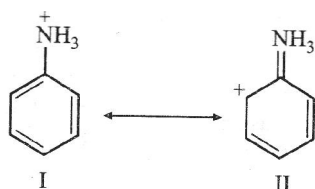
(2) mixture of (L) and (M)

(4) mixture of (K) and (L)

26. What is product (2) in the following reaction?



27. Two structures of anilinium ion are given below:



Which of the following statements is correct about the given structures?

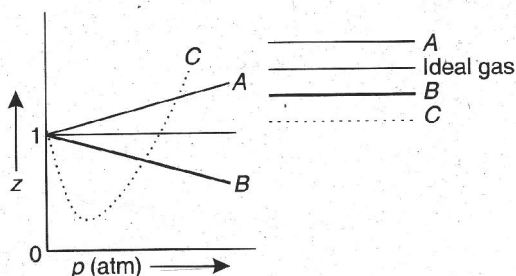
- (1) Carbonium ion is less stable than ammonium ion so II is not an acceptable canonical structure.
 - (2) Structure II is non-aromatic so it is not an acceptable canonical structure.
 - (3) In structure II nitrogen has 10 valence electrons, so it is not an acceptable canonical structure.
 - (4) II is an acceptable canonical structure.
28. What is the maximum possible number of hydrogen bonds that a water molecule can form?
- (1) 2
 - (2) 4
 - (3) 3
 - (4) 1

SECTION – II

Multiple Correct Choice Type

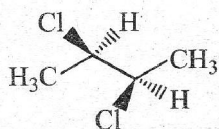
This section contains 4 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) for its answer, out of which ONE OR MORE is/are correct.

29. The given graph represents the variations of compressibility factor ($z = \frac{pV}{nRT}$) versus p , for three real gases A, B and C.



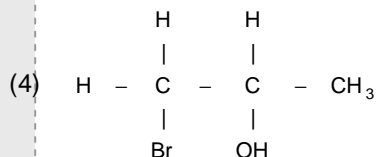
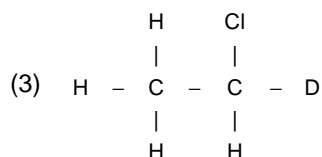
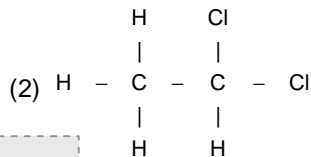
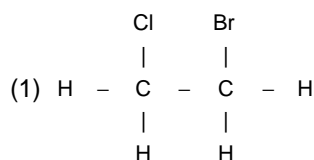
Which of these statements is not correct?

- (1) For the gas A, $a = 0$ and its dependence on p is linear at all pressures.
 - (2) For the gas B, $b = 0$ and its dependence on p is linear at all pressures.
 - (3) For the gas C, which is a typical real gas for which neither a or $b = 0$. By knowing the minima and the point of the intersection, with $z = 1$, a and b can be calculated.
 - (4) At high pressure, the slope is positive for all real gases.
30. The correct statement (s) about the compound given below is (are)



- (1) The compound is optically active.
- (2) The compound possesses a centre of symmetry.
- (3) The compound possesses a plane of symmetry.
- (4) The compound possesses an axis of symmetry.

31. Which of the following compounds has an asymmetric carbon atom?



32. Which of these compound(s) is /are more acidic than phenol?

- (1) acetic acid
 (2) p-methoxyphenol
 (3) p-nitrophenol
 (4) ethanol

SECTION – III

Comprehension Type

This section contains 2 groups of questions. Each group has 3 multiple choice questions based on a paragraph. Each question has 4 choices (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** is correct.

Paragraph for Question Nos. 33 – 35:

Wilkinson's catalyst is the common name for chlorotris-(triphenylphosphine) rhodium(I), a chemical compound. It is named after the late organometallic chemist and 1973 Nobel Laureate, Sir Geoffrey Wilkinson who popularized its use. Wilkinson's catalyst catalyzes the hydrogenation of alkenes. Other applications of Wilkinson's catalyst includes the catalytic hydroboration of alkenes with catecholborane and pinacolborane, and the selective 1,4-reduction of α, β -unsaturated carbonyl compounds in concert with triethylsilane.

33. Which of the following represent this catalyst?

- (1) $\text{RhCl}(\text{PPh}_3)_3$ (2) $\text{RhCl}_2(\text{PPh}_3)_3$ (3) $\text{RhCl}_3(\text{PPh}_3)_3$ (4) $\text{RhCl}_3(\text{PPh}_3)$

34. The hybridization of 'Rh' in this catalyst is

- (1) sp^3 (2) d^2sp^3 (3) sp^3d^2 (4) dsp^2

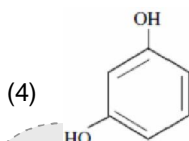
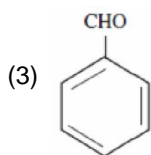
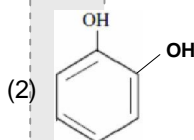
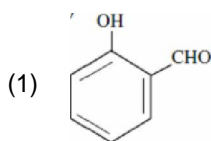
35. The catalyst discussed here can be called a

- (1) 14-electron complex (2) 16-electron complex
 (3) 18-electron complex (4) 20-electron complex

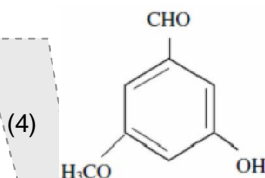
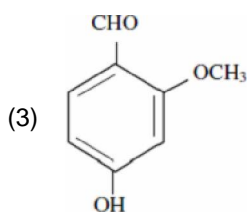
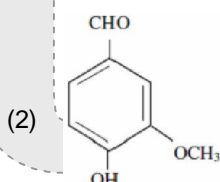
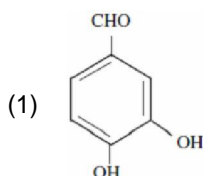
Paragraph for Question Nos. 36 – 38:

Vanillin 'A' ($C_8H_8O_3$) is isolated from vanilla beans. On treating with neutral $FeCl_3$, it gives intense blue colour. It also gives +ve Tollen's test. It reacts with conc HBr to give a compound 'B'. One mole of vanillin gives one mole of AgI with Zeise's active methoxy estimation. Catechol is obtained when compound 'B' is made to react with Tollen's reagent. Compound 'B' can be prepared from catechol by Gattermann-Koch reaction.

36. Compound 'B' on heating with zinc dust will give



37. Vanillin structure should be



38. Which of the following functional groups are present in Vanillin?

(1) One $-OC_2H_5$ group

(2) One $-OCH_3$ group

(3) One $-OC_3H_7$ group

(4) Two $-OCH_3$ groups

SECTION – IV
Matrix – Match Type

This section contains 2 questions. Each question contains statements given in two columns, which have to be matched. The statements in **Column I** are labeled A, B, C and D, while the statements in **Column II** are labeled p, q, r, s and t. Any given statement in **Column I** can have correct matching with **ONE OR MORE** statement(s) in **Column II**. The appropriate bubbles corresponding to the answers to these questions have to be darkened as illustrated in the following example:

If the correct matches are A – p, s and t; B – q and r; C – p and q; and D – s and t; then the correct darkening of bubbles will look like the following:

	p	q	r	s	t
A	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
B	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
C	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>

39.

Column – I	Column – II
(a) $\text{CH}_3\text{COCH}_3 + \text{CHCl}_3$	(p) Raoult's law
(b) $\text{C}_2\text{H}_5\text{OH} + \text{H}_2\text{O}$	(q) Ideal solution
(c) $P_A \propto X_A$	(r) Non-ideal with – ve deviation
(d) $P_A < P_A^\circ X_A$	(s) Non-ideal with + ve deviation

40.

Column – I	Column – II
(a) Ni-Cd cell	(p) Used in automobile vehicles
(b) Mercury cell	(q) Secondary cell
(c) $H_2 - O_2$ - cell	(r) Fuel Cell
(d) Lead storage battery	(s) Primary cell

