# JEE Main 2024 Chemistry Question Paper Jan 31 Shift 2

| Time Allowed :3 Hours | Maximum Marks :300 | Total Questions :90 |
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## General Instructions

**Read the following instructions very carefully and strictly follow them:**

1. The test is of 3 hours duration.
2. The question paper consists of 90 questions, out of which 75 are to attempted. The maximum marks are 300.
3. There are three parts in the question paper consisting of Physics, Chemistry and Mathematics having 30 questions in each part of equal weightage.
4. Each part (subject) has two sections.
   (i) Section-A: This section contains 20 multiple choice questions which have only one correct answer. Each question carries 4 marks for correct answer and –1 mark for wrong answer.
   (ii) Section-B: This section contains 10 questions. In Section-B, attempt any five questions out of 10. The answer to each of the questions is a numerical value. Each question carries 4 marks for correct answer and –1 mark for wrong answer. For Section-B, the answer should be rounded off to the nearest integer

## Chemistry
## SECTION A

**1. Statement 1: $S_8$ disproportionates into $H_2S_2O_3$ and $S^{2-}$ in alkaline medium**
**Statement 2: $ClO_3^-$ undergoes disproportionation in acidic medium**

(1) Statement 1 is correct but statement 2 is incorrect
(2) Statement 1 is incorrect but statement 2 is correct
(3) Both statement 1 and statement 2 are correct
(4) Both statement 1 and statement 2 are incorrect

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**2. Which of the following is correct?**

(1) $[NiCl]^{2}$ – diamagnetic
(2) [Ni(CO)] – diamagnetic
(3) $[NiCl]^{2}$ – paramagnetic
(4) [Ni(CO)] – paramagnetic

**3. Statement-I: Among $15^{th}$ group hydrides, reducing character decreases from NH to BiH.**
**Statement-II: $E_2O_3$ and $E_2O_5$ are always basic.**
Where E is group 15 element

(1) Both statement-I and Statement-II are correct
(2) Statement-I is correct and Statement-II is false
(3) Statement-I is false and Statement-II is correct
(4) Both statement-I and Statement-II are false

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**4. Which of the following has maximum ionic character?**

(1) KCl
(2) AgCl
(3) CoCl
(4) BaCl

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**5. Match the following:**

(a) $[Cr(H_2O)_6]^{3+}$ (i) $t_{2g}^2 e_g^0$
(b) $[Fe(H_2O)_6]^{3+}$ (ii) $t_{2g}^3 e_g^0$
(c) $[Ni(H_2O)_6]^{2+}$ (iii) $t_{2g}^6 e_g^2$
(d) $[V(H_2O)_6]^{3+}$ (iv) $t_{2g}^5 e_g^0$

(1) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
(2) (a)-(iii), (b)-(iv), (c)-(ii), (d)-(ii)
(3) (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)
(4) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

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**6. Quantum number for outermost electron of K-atom are given by**

(1) $n = 4, l = 0, m = 0, s = \frac{1}{2}$
(2) $n = 4, l = 1, m = 0, s = \frac{1}{2}$

(3) $n = 3, l = 0, m = 0, s = \frac{1}{2}$
(4) $n = 4, l = 0, m = 1, s = \frac{1}{2}$

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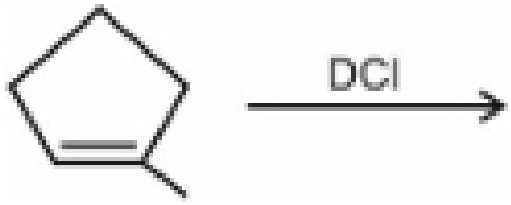
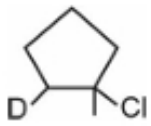
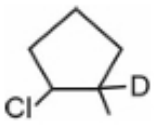
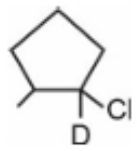
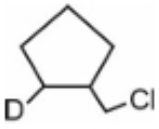
**7. What is the product formed in the below given reaction?**




(1) 


(2) 


(3) 


(4) 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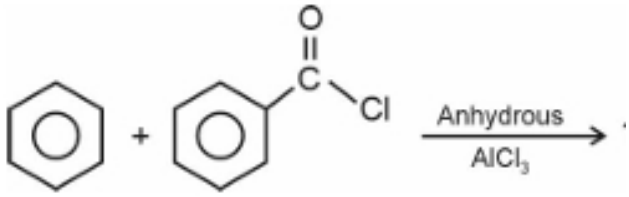
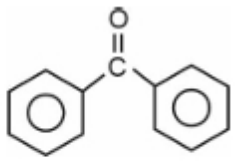
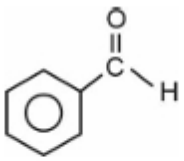
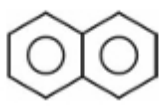
**8. What is the major product formed in the following reaction?**




(1) 


(2) 


(3) 

(4) 

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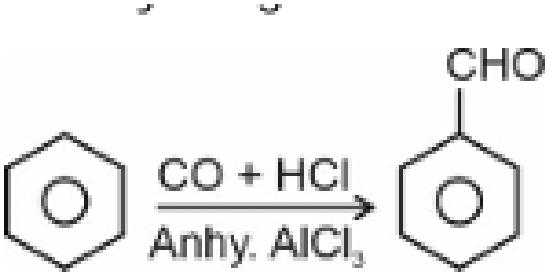
**9. Identify the given reaction**




(1) Rosenmund reaction
(2) Stephen reaction
(3) Gattermann Koch reaction
(4) Etard reaction

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**10. Choose the correct answers.**

(A) MnO is a oil at room temperature.
(B) VO react with acid to give $VO^{2}$.
(C) CrO is a basic oxide.
(D) VO does not react with acids.

(1) A, B and C only
(2) B, C and D only
(3) A only
(4) B and C only

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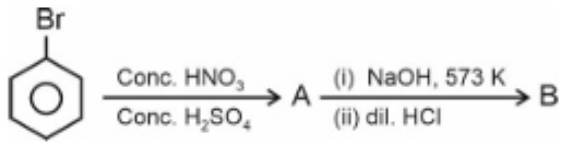
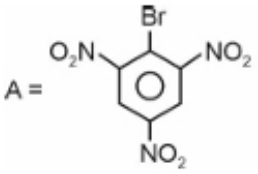
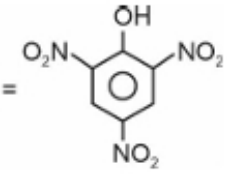
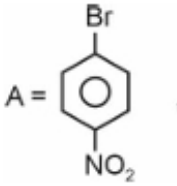
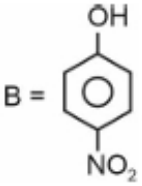
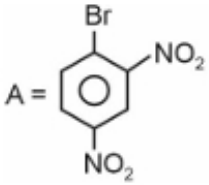
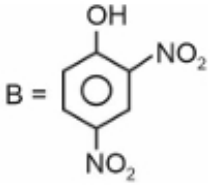
**11. Consider the following reaction:**

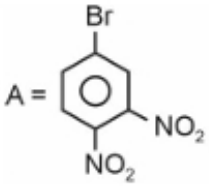
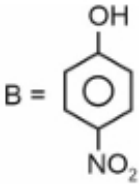



**A and B respectively are**

(1) A =  , B = 

(2) A =  , B = 

(3) A =  , B = 

(4) A =  , B = 

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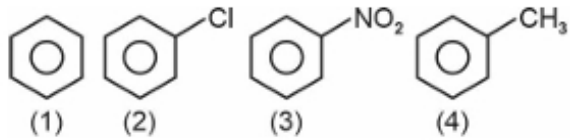
**12. What will be the reactivity order of the following compounds towards electrophilic substitution reaction?**




(1) 1 ¿ 3 ¿ 2 ¿ 4
(2) 4 ¿ 1 ¿ 2 ¿ 3
(3) 3 ¿ 2 ¿ 1 ¿ 4
(4) 4 ¿ 3 ¿ 1 ¿ 2

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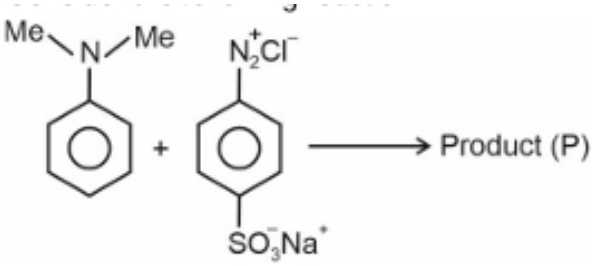
**13. Correct IUPAC structure for the given organic compound is**
**2,2-Dibromo-1-phenylpentane**

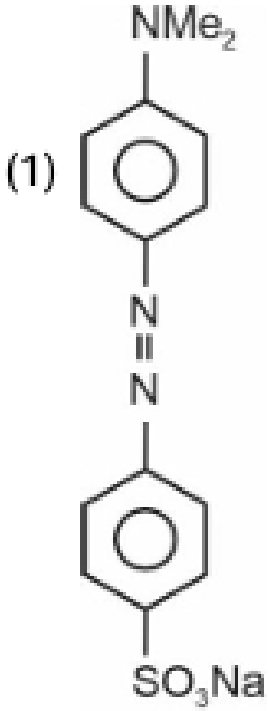
(1) $Ph - CH_2 - C - CH_2 - CH_3$
(2) $Ph - CH_2 - C - CH_2 - CH_3$
(3) $Ph - CH_2 - C - CH_2 - CH_2 - CH_2 - Br$
(4) $Ph - CH_2 - CH_2 - CH_2 - CH_3$

**15. Consider the following reaction.**




**(Where Me is CH)**

(1)

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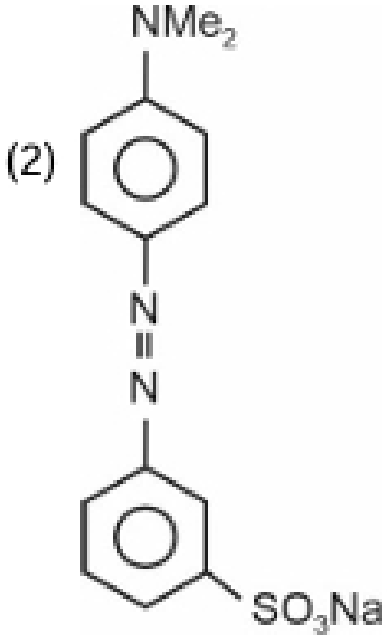

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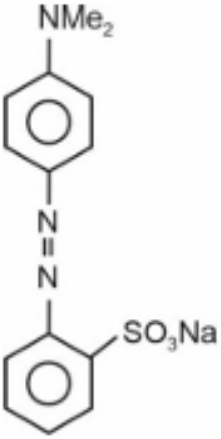


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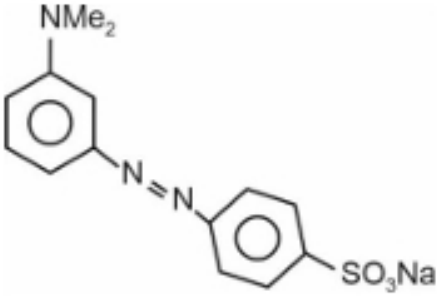


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**16.** $\mathbf{A(g) \rightleftharpoons B(g) + \frac{1}{2}\ C(g)}$

**In the above reaction, the correct relation between $K_p$, $\alpha$ and equilibrium pressure (p) is**

(1) $K_p = \frac{\alpha^2 p^2}{(2+\alpha)^2}$

(2) $K_p = \frac{\alpha^2 p^{3/2}}{(2+\alpha)^{3/2}}$

(3) $K_p = \frac{\alpha^2 p^{1/2}}{(2+\alpha)^{3/2}}$

(4) $K_p = \frac{\alpha^{3/2} p^{1/2}}{(2+\alpha)^{1/2}(1-\alpha)}$

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## SECTION B

**21. Half life of a first order reaction is 36 hr. Find out the time (in hr) required for the concentration of reactant to get reduced by 90%.**

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**22. A 1 mol ideal gas expands from 10 L to 100 L at 300 K. If the above expansion takes place reversibly and isothermally, then the magnitude of work done is ..... (in kJ)**

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**23. How many of the following vitamins are stored in the Human Body?**
A, B, C, D, E, K?

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**24. Number of moles of $H^+$ required by 1 mole $MnO_4^-$ to oxidize oxalate ion to $CO_2$ is .....**

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**25. The potassium chloride is heated with potassium dichromate and conc. sulphuric acid to give products. The oxidation state of chromium in the product is (+) .....**

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**26. Number of structural isomeric products formed by monochlorination of 2-methylbutane in the presence of sunlight is .....**

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