

JEE ADVANCED-2015

CHEMISTRY

Note: Answers have been highlighted in “Yellow” color and Explanations to answers are given at the end

General Instructions:

1. This sealed booklet is your Question Paper. Do not break the seal till you are instructed to do so.
2. The question paper CODE is printed on the left hand top corner of this sheet and the right hand top corner of the back cover of this booklet.
3. Use the Optical Response Sheet (ORS) provided separately for answering the questions.
4. The ORS CODE is printed on its left part as well as the right part. Ensure that both these codes are identical and same as that on the question paper booklet. If not, contact the invigilator.
5. Blank spaces are provided within this booklet for rough work.
6. Write your name and roll number in the space provided on the back cover of this booklet.
7. After breaking the seal of the booklet. Verify that the booklet contains 32 pages and that all the 60 questions along with the options are legible.

QUESTIONS PAPER FORMAT AND MARKING SCHEME:

8. The question paper has three parts: Physics, Chemistry and Mathematics. Each part has three sections.
9. Carefully read the instructions given at the beginning of each section.
10. Section 1 contains 8 questions. The answer to each question is a single digit integer ranging from 0 to 9 (both inclusive).

Marking scheme: +4 correct answer and 0 in all other cases.

11. Section 2 contains 10 multiple choice questions with one or more than one correct option.

Marking scheme: +4 for correct answer, 0 if not attempted and -2 in all other cases.

12. Section 3 contains 2 “paragraph” type questions. Each paragraph describes an experiment, a situation or a problem. Two multiple choice questions will be asked based on this paragraph. One of or more than one option can be correct.

Marking scheme: for each entry in Column I, +2 for correct answer, 0 if not attempted and - 1 in all other cases.

OPTICAL RESPONSE SHEET :

13. The ORS consists of an original (top sheet) and its carbon-less copy. (bottom sheet).
14. Darken the appropriate bubbles on the original by applying sufficient pressure. This will leave an impression at the corresponding place on the carbon-less copy.
15. The original is machine-gradable and will be collected by the invigilator at the end of the examination.
16. You will be allowed to take away the carbon-less copy at the end of the examination.
17. Do not tamper with or mutilate the ORS.
18. Write your name, roll number and the name of the examination center and sign with pen in the space provided for this purpose on the original. Do not write any of these details anywhere else. Darken the appropriate bubble under each digit of your roll number.

Note: Answers have been highlighted in “Yellow” color and Explanations to answers are given at the end

SECTION-1 (Maximum Mark : 32)

- This section contains **EIGHT** questions.
- The answer to each question is a **SINGLE DIGIT INTEGER** ranging from 0 to 9, both inclusive
- For each question, darken the bubble corresponding to the correct integer in the ORS
- Marking scheme:
+4 If the bubble corresponding to the answer is darkened

Q.21 In the complex acetyl bromide dicarbonyl bis (triethyl phosphine) iron(II), the number of Fe-C bond(s) is

Q.22 Among the complex ions $[\text{Co}(\text{NH}_2\text{-CH}_2\text{-CH}_2\text{-NH}_2)_2\text{Cl}_2]^+$, $[\text{CrCl}_2(\text{C}_2\text{O}_4)_2]^{3-}$, $[\text{Fe}(\text{H}_2\text{O})_4(\text{OH})_2]^+$, $[\text{Fe}(\text{NH}_3)_2(\text{CN})_4]$, $[\text{Co}(\text{NH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-NH}_2)_2(\text{NH}_3)\text{Cl}]^{2+}$ and $[\text{Co}(\text{NH}_3)_4(\text{H}_2\text{OCl})]^{2+}$, the number of complex ion(s) that show(s) cis-trans isomerism is

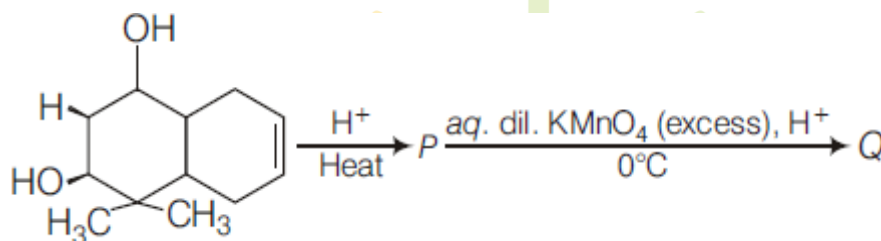
Q.23 Three moles of B_2H_6 are completely reacted with methanol. The number of moles of boron containing product formed is

Q.24 The molar conductivity of a solution of a weak acid $\text{HX}(0.001\text{M})$ is 10 times smaller than the molar conductivity of a solution of a weak acid $\text{HY}(0.10\text{M})$. If, $\lambda_{x-}^0 \approx \lambda_{y-}^0$, the difference is their pK_a values, $\text{pK}_a(\text{HX}) - \text{pK}_a(\text{HY})$, is (consider degree of ionization of both acids be $\ll 1$)

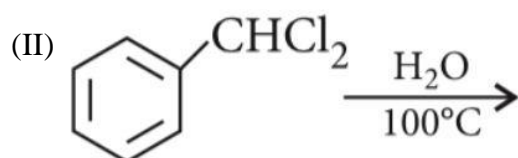
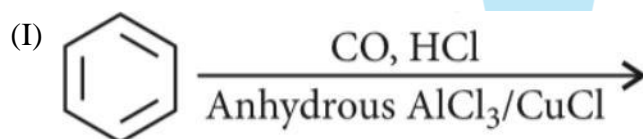
Q.25 A closed vessel with rigid walls contains 1 mol of ${}^{238}_{92}\text{U}$ and 1 mol of air at 298 K . Considering complete decay of ${}^{238}_{92}\text{U}$ to ${}^{206}_{82}\text{Pb}$ the ratio of the final pressure to the initial pressure of the system at 298 K is

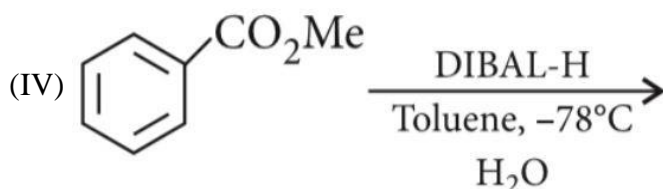
Q.26 In dilute aqueous H_2SO_4 , the complex diaquodioxalatoferate(II) is oxidized by MnO_4^- . For this reaction, the ratio of the rate of change of $[\text{H}^+]$ to the rate of change of $[\text{MnO}_4^-]$ is

Q.27 The number of hydroxyl group(s) in Q is



Q.28 Among the following, the number of reaction(s) that produce (s) benzaldehyde is





SECTION-2 (Maximum Mark : 32)

- This section contains **EIGHT** questions.
- Each question has **FOUR** option (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option (s) is (are) correct
- For each questions, darken the bubble (s) corresponding to all the correct option (s) in the ORS
- Marking scheme:
 - +4 If only the bubble (s) corresponding to all the correct option (s) is (are) darkened
 - 0 If none of the bubbles is darkened
 - 2 In all other case

Q.29 When O_2 is adsorbed on a metallic surface, electron transfer occurs from the metal to O_2 . The TRUE statement(s) regarding this adsorption is(are)

- (A) O_2 is physisorbed
- (B) heat is released
- (C) occupancy of π_{2p}^* of O_2 is increased
- (D) bond length of O_2 is increased

Q.30 Under hydrolytic conditions, the compounds used for preparation of linear polymer and for chain termination, respectively, are

- (A) CH_3SiCl_3 and $\text{Si}(\text{CH}_3)_4$
- (B) $(\text{CH}_3)_2\text{SiCl}_2$ and $(\text{CH}_3)_3\text{SiCl}$
- (C) $(\text{CH}_3)_2\text{SiCl}_2$ and CH_3SiCl_3
- (D) SiCl_4 and $(\text{CH}_3)_3\text{SiCl}$

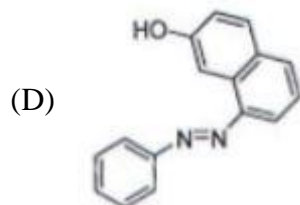
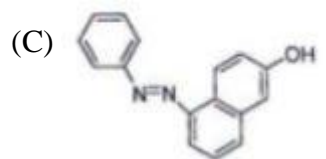
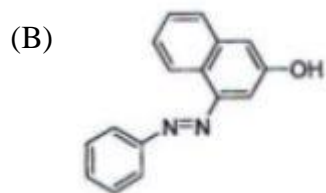
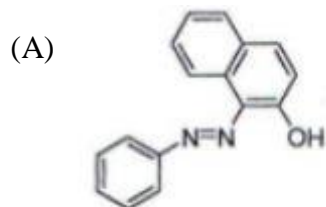
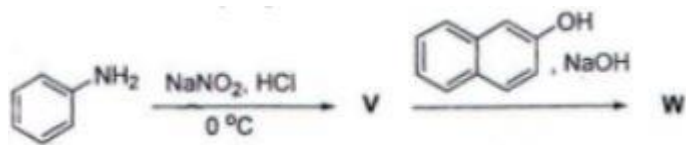
Q.31 The pair(s) of ions where BOTH the ions are precipitated upon passing H_2S gas in presence of dilute HCl , is(are)

- (A) Ba^{2+} , Zn^{2+}
- (B) Bi^{3+} , Fe^{3+}
- (C) Cu^{2+} , Pb^{2+}
- (D) Hg^{2+} , Bi^{3+}

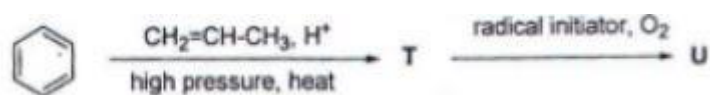
Q.32 The correct statement(s) regarding, (i) HClO , (ii) HClO_2 , (iii) HClO_3 and (iv) HClO_4 , is (are)

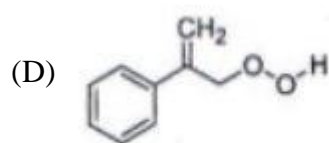
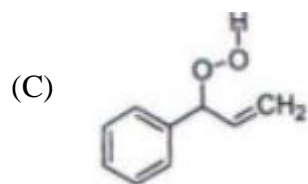
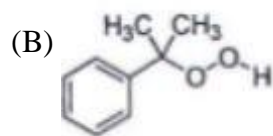
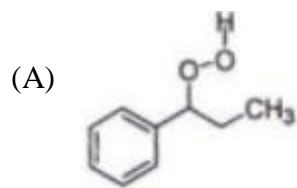
- (A) The number of $\text{Cl}=\text{O}$ bonds in (ii) and (iii) together is two
- (B) The number of lone pairs of electrons on Cl in (ii) and (iii) together is three
- (C) The hybridization of Cl in (iv) is sp^3
- (D) Amongst (i) to (iv), the strongest acid is (i)

Q.33 In the following reactions, the major product W is

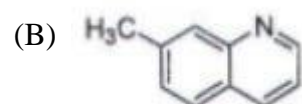
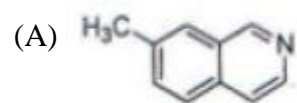
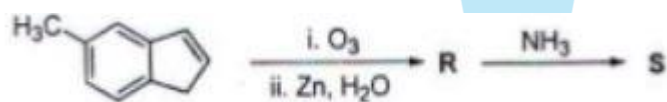


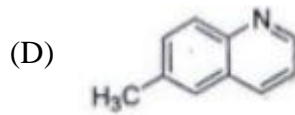
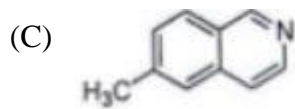
Q.34 The major product U in the following reactions is



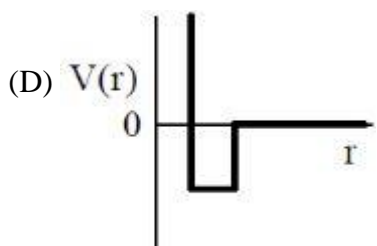
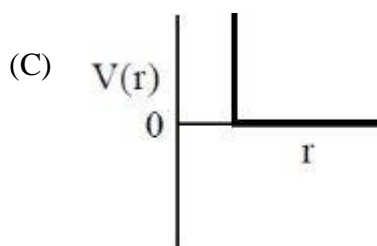
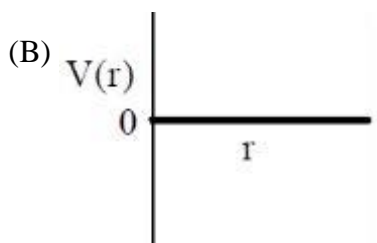
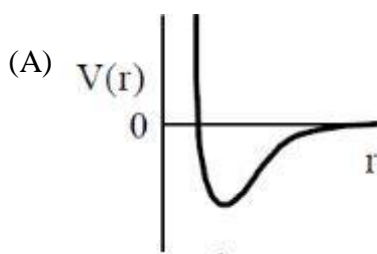


Q.35 In the following reactions, the product S is





Q.36 One mole of a monatomic real gas satisfies the equation $p(V-b) = RT$ where b is a constant. The relationship of interatomic potential $V(r)$ and interatomic distance r for the gas is given by



SECTION-3 (Maximum Mark : 16)

- This section contains **EIGHT** questions.
- Based on each paragraph, there will be TWO questions
- Each question has **FOUR** option (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option (s) is (are) correct
- For each questions, darken the bubble (s) corresponding to all the correct option (s) in the ORS
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 - 0 If none of the bubbles is darkened
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PARAGRAPH 1

When 100 mL of 1.0 M HCl was mixed with 100 mL of 1.0 M NaOH in an insulated beaker at constant pressure, a temperature increase of 5.7 °C was measured for the beaker and its contents (Expt. 1). Because the enthalpy of neutralization of a strong acid with a strong base is a constant ($-57.0 \text{ kJ mol}^{-1}$), this experiment could be used to measure the calorimeter constant

In a second experiment (Expt. 2), 100 mL of 2.0 M acetic acid ($K_a = 2.0 \times 10^{-5}$) was mixed with 1000 mL of 1.0 M NaOH (under identical conditions to Expt.1) where a temperature rise of 5.6° was measured.

(Consider heat capacity of all solutions as $4.2 \text{ J g}^{-1} \text{ K}^{-1}$ and density of all solutions as 1.0 g mL^{-1})

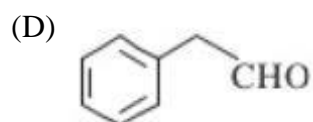
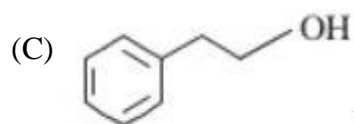
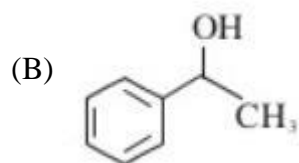
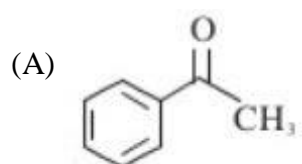
Q.37 Enthalpy of dissociation (in kJ mol^{-1}) of acetic obtained from the Expt.2 is

- (A) 1.0
- (B) 10.0
- (C) 24.5
- (D) 51.4

Q.38 The pH of the solution after Expt.2 is

- (A) 2.8
- (B) 4.7
- (C) 5.0
- (D) 7.0

Q.39 Compound X is



Q.40 The major compound Y is

