

JEE Main 2023 Jan 30 Shift 1 Chemistry Question Paper

Total Time Allowed : 180 minutes	Maximum Marks : 300	Total Questions : 90	Questions to be answered : 90
-------------------------------------	------------------------	----------------------	----------------------------------

General Instructions

Read the following instructions very carefully and strictly follow them:

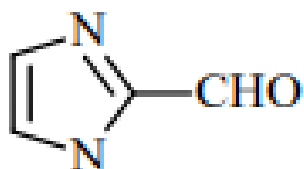
- (1) The test is of 3 hours duration.
- (2) The question paper consists of 90 questions. The maximum marks are 300.
- (3) There are three parts in the question paper consisting of Physics, Chemistry and Mathematics having 30 questions in each part of equal weightage.
- (4) Each part (subject) has two 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**

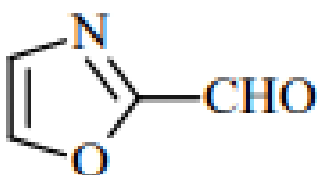
Question 1: Which of the following compounds would give the following set of qualitative analysis?

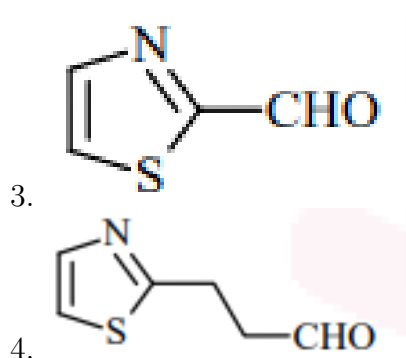
- (i) Fehling's Test: Positive
- (ii) Na fusion extract upon treatment with sodium nitroprusside gives a blood red colour but not

1.

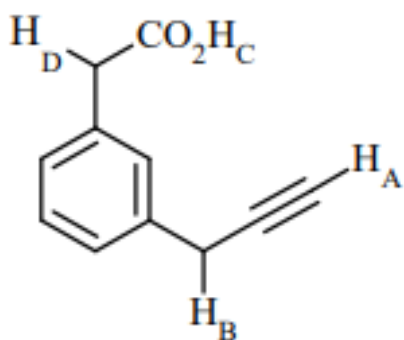


2.





Question 2: What is the correct order of acidity of the protons marked A-D in the given compounds?



- (1) $H_C > H_D > H_B > H_A$
- (2) $H_C > H_D > H_A > H_B$
- (3) $H_D > H_C > H_B > H_A$
- (4) $H_C > H_A > H_D > H_B$

Question 3: Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Ketoses give Seliwanoff's test faster than Aldoses.

Reason (R): Ketoses undergo β -elimination followed by formation of furfural.

In light of the above statements, choose the correct answer from the options given below:

- (1) (A) is false but (R) is true
- (2) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are true but (R) is not the correct explanation of (A)

Question 4: In the extraction of copper, its sulphide ore is heated in a reverberatory furnace after mixing with silica to:

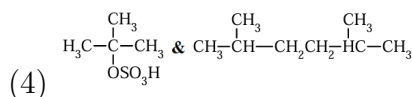
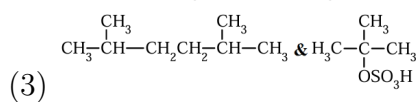
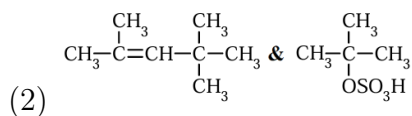
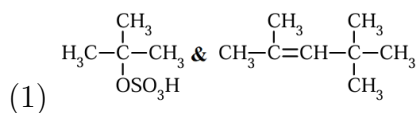
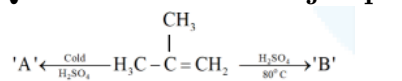
- (1) separate CuO as $CuSiO_3$

- (2) remove calcium as $CaSiO_3$
- (3) decrease the temperature needed for roasting of Cu_2S
- (4) remove FeO as $FeSiO_3$

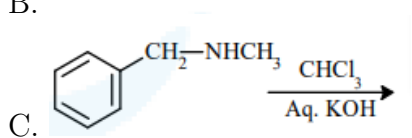
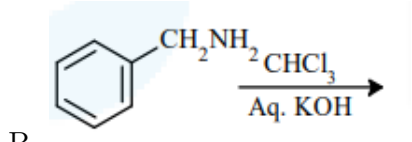
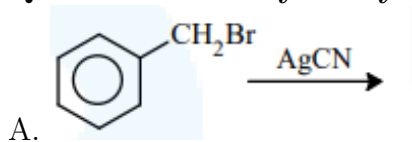
Question 5: Amongst the following compounds, which one is an antacid?

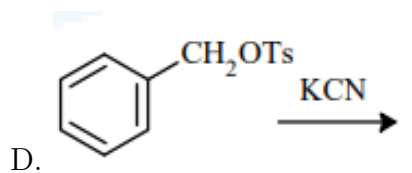
- (1) Ranitidine
- (2) Meprobamate
- (3) Terfenadine
- (4) Brompheniramine

Question 6: The major products 'A' and 'B', respectively, are:



Question 7: Benzyl isocyanide can be obtained by:





Choose the correct answer from the options given below:

- (1) A and D
- (2) Only B
- (3) A and B
- (4) B and C

Question 8: Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

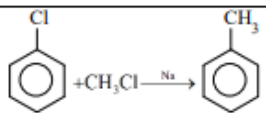
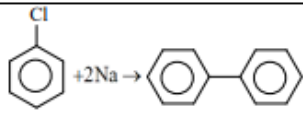
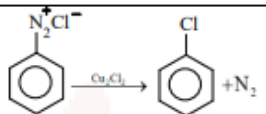
Assertion (A): In expensive scientific instruments, silica gel is kept in watch-glasses or in semipermeable membrane bags.

Reason (R): Silica gel adsorbs moisture from air via adsorption, thus protects the instrument from water corrosion (rusting) and/or prevents malfunctioning.

In the light of the above statements, choose the correct answer from the options given below:

- (1) A is false but (R) is true
- (2) A is true but (R) is false
- (3) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (4) Both (A) and (R) are true but (R) is not the correct explanation of (A)

Question 9: Match List I with List II:

List I		List II	
A		I	Fitting reaction
B		II	Wurtz Fitting reaction
C		III	Finkelstein reaction
D	$\text{C}_2\text{H}_5\text{Cl} + \text{NaI} \rightarrow \text{C}_2\text{H}_5\text{I} + \text{NaCl}$	IV	Sandmeyer reaction

- (1) A – IV, B – I, C – III, D – II

- (2) A – I, B – II, C – IV, D – III
(3) A – I, B – III, C – II, D – I
(4) A – II, B – I, C – IV, D – III
-

Question 10: Caprolactam when heated at high temperature in presence of water gives:

- (1) Teflon
(2) Dacron
(3) Nylon 6, 6
(4) Nylon 6
-

Question 11: The alkaline earth metal sulphate(s) which are readily soluble in water is/are:

- (A) BeSO_4
(B) MgSO_4
(C) CaSO_4
(D) SrSO_4
(E) BaSO_4

Choose the **correct answer** from the options given below:

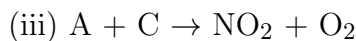
- 1) A only
2) B only
3) A and B
4) B and C
-

Question 12: Which of the following is the correct order of ligand field strength?

- (1) $\text{CO} < \text{en} < \text{NH}_3 < \text{C}_2\text{O}_4^{2-} < \text{S}^{2-}$
(2) $\text{S}^{2-} < \text{C}_2\text{O}_4^{2-} < \text{NH}_3 < \text{en} < \text{CO}$
(3) $\text{NH}_3 < \text{en} < \text{CO} < \text{S}^{2-} < \text{C}_2\text{O}_4^{2-}$
(4) $\text{S}^{2-} < \text{NH}_3 < \text{en} < \text{CO} < \text{C}_2\text{O}_4^{2-}$
-

Question 13: Formation of photochemical smog involves the following reaction in which A, B, and C are respectively.

- (i) $\text{NO}_2 \xrightarrow{h\nu} \text{A} + \text{B}$
(ii) $\text{B} + \text{O}_2 \rightarrow \text{C}$



Choose the correct answer from the options given below:

- (1) O, NO, and NO_3^-
 - (2) N_2O and NO
 - (3) N, O_2 , and O_3
 - (4) NO, O, and O_3
-

Question 14: During the qualitative analysis of SO_3^{2-} using dilute H_2SO_4 , SO_2 gas is evolved which turns $K_2Cr_2O_7$ solution (acidified with dilute H_2SO_4):

- (1) Black
 - (2) Red
 - (3) Green
 - (4) Blue
-

Question 15: To inhibit the growth of tumours, identify the compounds used from the following:

- (A) EDTA
- (B) Coordination Compounds of Pt
- (C) D – Penicillamine
- (D) Cis – Platin

Choose the correct answer from the options given below:

- (1) B and D Only
 - (2) C and D Only
 - (3) A and B Only
 - (4) A and C Only
-

Question 16: In the wet tests for identification of various cations by precipitation, which transition element cation doesn't belong to group IV in qualitative inorganic analysis?

- (1) Fe^{3+}
 - (2) Zn^{2+}
 - (3) Co^{2+}
 - (4) Ni^{2+}
-

Question 17: Match List I with List II

LIST-I (molecules/ions)	LIST-II (No. of lone pairs of e^- on central atom)
(A) IF_7	I. Three
(B) ICl_4^-	II. One
(C) XeF_6	III. Two
(D) XeF_2	IV. Zero

Choose the **correct answer** from the options given below:

- (1) A – II, B – III, C – IV, D – I
- (2) A – IV, B – III, C – II, D – I
- (3) A – II, B – I, C – IV, D – III
- (4) A – IV, B – I, C – II, D – III

Question 18: For OF_2 molecule consider the following:

- (A) Number of lone pairs on oxygen is 2.
- (B) $F-O-F$ angle is less than 104.5° .
- (C) Oxidation state of O is -2 .
- (D) Molecule is bent 'V' shaped.
- (E) Molecular geometry is linear.

Correct options are:

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

Question 19: Lithium aluminium hydride can be prepared from the reaction of:

- (1) $LiCl$ and Al_2H_6
- (2) LiH and Al_2Cl_6
- (3) $LiCl$, Al and H_2
- (4) LiH and $Al(OH)_3$

Question 20: Match List – I with List – II

LIST-I (Atomic number)	LIST-II (Block of periodic table)
(A) 37 (K)	I. p-block
(B) 78 (Pt)	II. d-block
(C) 52 (Te)	III. f-block
(D) 65 (Tb)	IV. s-block

Choose the **correct answer** from the options given below:

- (1) A – II, B – IV, C – I, D – III
 - (2) A – I, B – III, C – IV, D – II
 - (3) A – IV, B – III, C – II, D – I
 - (4) A – IV, B – II, C – I, D – III
-

Section B

Question 21: Consider the cell



When the potential of the cell is 0.712 V at 298 K, the ratio $\frac{[\text{Fe}^{2+}]}{[\text{Fe}^{3+}]}$ is -----.
(Nearest integer)

Given:



$$\frac{2.303RT}{F} = 0.06 \text{ V}.$$

Question 22: A 300 mL bottle of soft drink has 0.2 M CO₂ dissolved in it. Assuming CO₂ behaves as an ideal gas, the volume of the dissolved CO₂ at STP is ----- mL. (Nearest integer)

Given: At STP, molar volume of an ideal gas is 22.7 L mol⁻¹.

Question 23: A solution containing 2 g of a non-volatile solute in 20 g of water boils at 373.52 K. The molecular mass of the solute is ----- g mol⁻¹. (Nearest integer)

Given: Water boils at 373 K, K_b for water = 0.52 K kg mol⁻¹.

Question 24: If compound A reacts with B following first-order kinetics with rate constant $2.011 \times 10^{-3} \text{ s}^{-1}$, the time taken by A (in seconds) to reduce from 7 g to 2 g will be ----- . (Nearest Integer)

Given:

$$\log 5 = 0.698, \quad \log 7 = 0.845, \quad \log 2 = 0.301.$$

Question 25: The energy of one mole of photons of radiation of frequency $2 \times 10^{12} \text{ Hz}$ in J mol⁻¹ is ----- . (Nearest integer)

Given: $h = 6.626 \times 10^{-34} \text{ Js}$, $N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$.

Question 26: The number of electrons involved in the reduction of permanganate to manganese dioxide in acidic medium is

Question 27: When 2 liters of ideal gas expands isothermally into a vacuum to a total volume of 6 liters, the change in internal energy is J. (Nearest integer)

Question 28: 600 mL of 0.01 M HCl is mixed with 400 mL of 0.01 M H_2SO_4 . The pH of the mixture is $\times 10^{-2}$. (Nearest integer)
Given:

$$\log 2 = 0.30, \quad \log 3 = 0.48, \quad \log 5 = 0.69, \quad \log 7 = 0.84, \quad \log 11 = 1.04.$$

Question 29: A trisubstituted compound 'A', $\text{C}_{10}\text{H}_{12}\text{O}_2$, gives neutral FeCl_3 test positive. Treatment of compound 'A' with NaOH and CH_3Br gives $\text{C}_{11}\text{H}_{14}\text{O}_2$, with hydroiodic acid gives methyl iodide and with hot conc. NaOH gives a compound 'B', $\text{C}_{10}\text{H}_{12}\text{O}_2$. Compound 'A' also decolourises alkaline KMnO_4 . The number of π bond/s present in the compound 'A' is

Question 30: Some amount of dichloromethane (CH_2Cl_2) is added to 671.141 mL of chloroform (CHCl_3) to prepare a 2.6×10^{-3} M solution of CH_2Cl_2 (DCM). The concentration of DCM is ppm (by mass).

Given: Atomic mass C = 12, H = 1, Cl = 35.5, density of $\text{CHCl}_3 = 1.49 \text{ g cm}^{-3}$.
