

JEE Main 2023 29 Jan Shift 2 Chemistry Question Paper

Time Allowed :180 minutes	Maximum Marks :300	Total questions :90
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General Instructions

Read the following instructions very carefully and strictly follow them:

(A) The test is of 3 hours duration.

(B) The question paper consists of 90 questions. The maximum marks are 300.

(C) There are three parts in the question paper consisting of Physics, Chemistry and Mathematics having 30 questions in each part of equal weightage.

(D) 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.

1. Given below are two statements:

Statement I: The decrease in first ionization enthalpy from B to Al is much larger than that from Al to Ga.

Statement II: The d orbitals in Ga are completely filled.

In the light of the above statements, choose the most appropriate answer from the options given below

- (1) Statement I is incorrect but statement II is correct.
 - (2) Both the statements I and II are correct
 - (3) Statement I is correct but statement II is incorrect
 - (4) Both the statements I and II are incorrect
-

2. Correct order of spin-only magnetic moment of the following complex ions is:

(Given At. No. Fe: 26, Co: 27)

- (1) $[\text{FeF}_6]^{3-} > [\text{CoF}_6]^{3-} > [\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$
 - (2) $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-} > [\text{CoF}_6]^{3-} > [\text{FeF}_6]^{3-}$
 - (3) $[\text{FeF}_6]^{3-} > [\text{Co}(\text{C}_2\text{O}_4)_3]^{3-} > [\text{CoF}_6]^{3-}$
 - (4) $[\text{CoF}_6]^{3-} > [\text{FeF}_6]^{3-} > [\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$
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3. Match List-I and List-II:

List-I	List-II
A. Osmosis	I. Solvent molecules pass through semi-permeable membrane towards solvent side.
B. Reverse osmosis	II. Movement of charged colloidal particles under the influence of applied electric potential towards oppositely charged electrodes.
C. Electro osmosis	III. Solvent molecules pass through semi-permeable membrane towards solution side.
D. Electrophoresis	IV. Dispersion medium moves in an electric field.

Choose the correct answer from the options given below:

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

4. The set of correct statements is:

- (i) Manganese exhibits +7 oxidation state in its oxide.
 - (ii) Ruthenium and Osmium exhibit +8 oxidation states in their oxides.
 - (iii) Sc shows +4 oxidation state which is oxidizing in nature.
 - (iv) Cr shows oxidizing nature in +6 oxidation state.
- (1) (i) and (iii)
 - (2) (i), (ii) and (iv)
 - (3) (i) and (iii)
 - (4) (ii), (iii) and (iv)

5. Match List-I and List-II:

List-I

List-II

A. Elastomeric polymer

I. Urea formaldehyde resin

B. Fibre polymer

II. Polystyrene

C. Thermosetting polymer

III. Polyester

D. Thermoplastic polymer

IV. Neoprene

Options:

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

6. An indicator 'X' is used for studying the effect of variation in concentration of iodide on the rate of reaction of iodide ion with H_2O_2 at room temperature. The indicator 'X' forms blue colored complex with compound 'A' present in the solution. The indicator

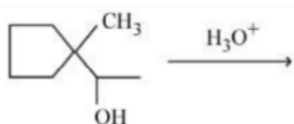
‘X’ and compound ‘A’ respectively are:

- (1) Starch and iodine
 - (2) Methyl orange and H_2O_2
 - (3) Starch and H_2O_2
 - (4) Methyl orange and iodine
-

7. A doctor prescribed the drug Equanil to a patient. The patient was likely to have symptoms of which disease?

- (1) Stomach ulcers
 - (2) Hyperacidity
 - (3) Anxiety and stress
 - (4) Depression and hypertension
-

8. Find out the major product for the following reaction:



→ Major Product

- (1)
 - (2)
 - (3)
 - (4)
-

9. The one giving maximum number of isomeric alkenes on dehydrohalogenation reaction is (excluding rearrangement):

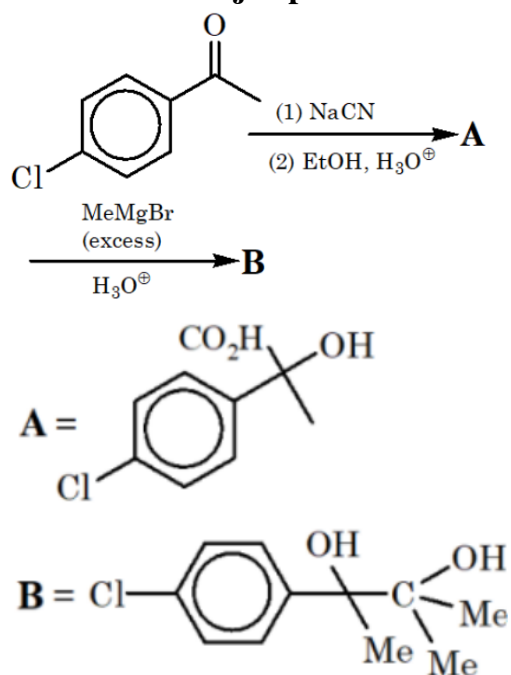
- (1) 1-Bromo-2-methylbutane

- (2) 2-Bromopropane
- (3) 2-Bromopentane
- (4) 2-Bromo-3,3-dimethylpentane

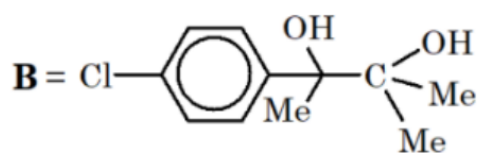
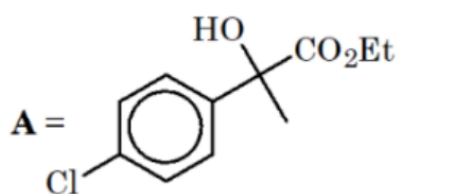
10. When a hydrocarbon A undergoes combustion in the presence of air, it requires 9.5 equivalents of oxygen and produces 3 equivalents of water. What is the molecular formula of A?

- (1) C_8H_6
- (2) C_9H_9
- (3) C_6H_6
- (4) C_9H_6

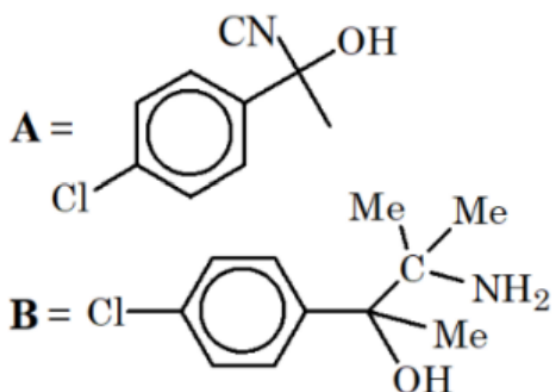
11. Find out the major products from the following reaction sequence:



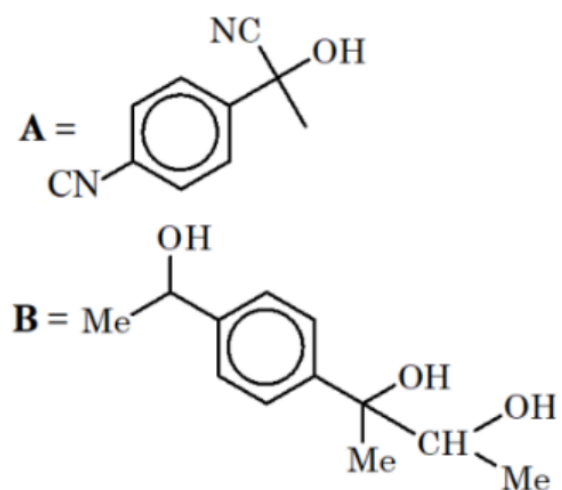
(A)



(B)



(C)



(D)

12. According to MO theory, the bond orders for O_2^- , CO, and NO^+ , respectively, are:

- (1) 1, 3, and 3
 - (2) 1, 3, and 2
 - (3) 1, 2, and 3
 - (4) 2, 3, and 3
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13. A solution of CrO_3 in amyl alcohol has a ... colour:

- (1) Green
 - (2) Orange-Red
 - (3) Yellow
 - (4) Blue
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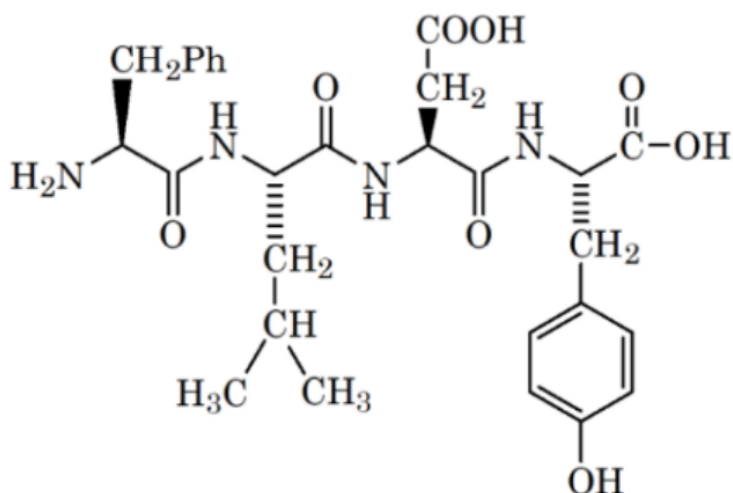
14. The concentration of dissolved oxygen in water for growth of fish should be more than X ppm, and biochemical oxygen demand in clean water should be less than Y ppm. X and Y in ppm are respectively:

- (1) X Y
6 5
 - (2) X Y
4 8
 - (3) X Y
4 15
 - (4) X Y
6 12
-

15. Reaction of propanamide with Br_2/KOH (aq) produces:

- (1) Ethyl nitrile
 - (2) Propylamine
 - (3) Propanenitrile
 - (4) Ethylamine
-

16. Following tetrapeptide can be represented as:



(F, L, D, Y, I, Q, P are one-letter codes for amino acids)

- (1) FIQY
- (2) FLDY
- (3) YQLF
- (4) PLDY

17. Which of the following relations are correct?

- (A) $\Delta U = q + p\Delta V$
- (B) $G = H - TS$
- (C) $\Delta S = \frac{q_{\text{rev}}}{T}$
- (D) $\Delta H = \Delta U - nRT$

Choose the most appropriate answer from the options given below:

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

18. The major component of which of the following ore is sulphide based mineral?

- (1) Calamine
- (2) Siderite
- (3) Sphalerite
- (4) Malachite

19. Given below are two statements:

Statement I: Nickel is being used as the catalyst for producing syn gas and edible fats.

Statement II: Silicon forms both electron-rich and electron-deficient hydrides.

Choose the most appropriate answer from the options given below:

- (1) Both the statements I and II are correct
 - (2) Statement I is incorrect but statement II is correct
 - (3) Both the statements I and II are incorrect
 - (4) Statement I is correct but statement II is incorrect
-

20. Match List I with List II:

List I

A. van't Hoff factor, i

B. k_f

C. Solutions with same osmotic pressure

D. Azeotropes

List II

I. Cryoscopic constant

II. Isotonic solutions

III. Normal molar mass / Abnormal Mass

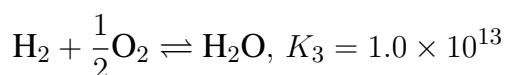
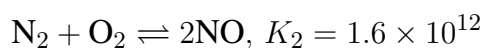
IV. Solutions with same composition of vapour above it

Choose the correct answer from the options given below:

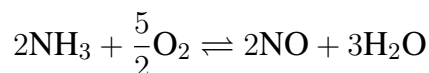
- (1) A-III, B-I, C-II, D-IV
 - (2) A-II, B-I, C-III, D-IV
 - (3) A-III, B-II, C-IV, D-I
 - (4) A-I, B-III, C-II, D-IV
-

21. On heating, LiNO_3 gives how many compounds among the following? Li_2O , N_2 , O_2 , LiNO_2 , NO_2

22. At 298 K:



Based on the above equilibria, the equilibrium constant of the reaction:



is $\dots \times 10^{-33}$ (nearest integer).

23. For conversion of compound $\text{A} \rightarrow \text{B}$, the rate constant of the reaction was found to be $4.6 \times 10^{-5} \text{ L mol}^{-1} \text{ s}^{-1}$. The order of the reaction is ...

24. Total number of acidic oxides among N_2O_3 , NO , N_2O , Cl_2O_7 , SO_2 , CO , CaO , Na_2O and NO_2 is ...

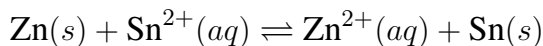
25. When 0.01 mol of an organic compound containing 60% carbon was burnt completely, 4.4 g of CO_2 was produced. The molar mass of the compound is $\dots \text{ g mol}^{-1}$ (nearest integer).

26. The denticity of the ligand present in Fehling's reagent is ...

27. A metal M forms hexagonal close-packed structure. The total number of voids in 0.02 mol of it is $\dots \times 10^{21}$ (Nearest integer). (Given $N_A = 6.02 \times 10^{23}$)

28. Assume that the radius of the first Bohr orbit of hydrogen atom is 0.6 \AA . The radius of the third Bohr orbit of He^+ is ... picometer (Nearest integer).

29. The equilibrium constant for the reaction:



is 1×10^{20} at 298 K. The magnitude of standard electrode potential of Sn^{2+}/Sn if

$E_{\text{Zn}^{2+}/\text{Zn}}^\circ = -0.76 \text{ V}$ is $\dots \times 10^{-2} \text{ V}$ (Nearest integer).

30. The volume of HCl containing 73 g L^{-1} , required to completely neutralize NaOH obtained by reacting 0.69 g of metallic sodium with water, is ... mL (Nearest integer).
