

JEE Main 2023 April 6 Shift 2 Chemistry Question Paper

Time Allowed :1 Hour	Maximum Marks :100	Total Questions :30
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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. 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.

1. Match List I with List II:

List I (Natural Amino Acid)	List II (One Letter Code)
(A) Arginine	(I) D
(B) Aspartic acid	(II) N
(C) Asparagine	(III) A
(D) Alanine	(IV) R

Options:

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

2. Formation of which complex, among the following, is not a confirmatory test of Pb^{2+} ions?

Options:

- (1) Lead sulfate
- (2) Lead nitrate
- (3) Lead chromate
- (4) Lead iodide

3. The volume of 0.02 M aqueous HBr required to neutralize 10.0 mL of 0.01 M aqueous Ba(OH)₂ is _____. (Assume complete neutralization.)

Options:

- (1) 5.0 mL
- (2) 10.0 mL
- (3) 2.5 mL
- (4) 7.5 mL

4. Group-13 elements react with O₂ in amorphous form to form oxides of type M₂O₃ (M = element). Which among the following is the most basic oxide?

Options:

- (1) Al₂O₃
- (2) Tl₂O₃
- (3) Ga₂O₃
- (4) B₂O₃

5. The IUPAC name of K₃[Co(C₂O₄)₃] is _____.

Options:

- (1) Potassium tris(oxalato)cobaltate(III)
- (2) Potassium trioxalatocobalt(III)
- (3) Potassium trioxalatocobaltate(III)
- (4) Potassium tris(oxalato)cobalt(III)

6. If the radius of the first orbit of the hydrogen atom is a_0 , then de Broglie's wavelength of the electron in the 3rd orbit is:

Options:

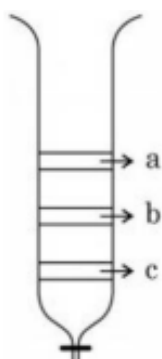
- (1) $\frac{\pi a_0}{6}$
- (2) $\frac{\pi a_0}{3}$
- (3) $6\pi a_0$
- (4) $3\pi a_0$

7. The group of chemicals used as pesticides is:

Options:

- (1) Sodium chlorate, DDT, PAN
- (2) DDT, Aldrin
- (3) Aldrin, Sodium chlorate, Sodium arsenite
- (4) Dieldrin, Sodium arsenite, Tetrachloroethene

8. From the figure of column chromatography given below, identify the incorrect statements:



- A. Compound 'c' is more polar than 'a' and 'b'
- B. Compound 'a' is least polar
- C. Compound 'b' comes out of the column before 'c' and after 'a'
- D. Compound 'a' spends more time in the column

Options:

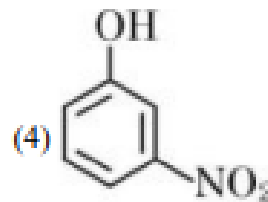
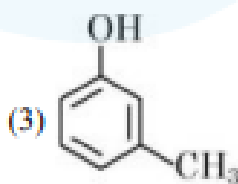
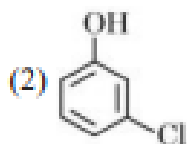
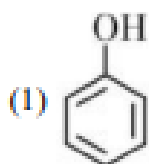
- (1) A, B, and D only
- (2) A, B, and C only
- (3) B and D only
- (4) B, C, and D only

9. Ion having the highest hydration enthalpy among the given alkaline earth metal ions is:

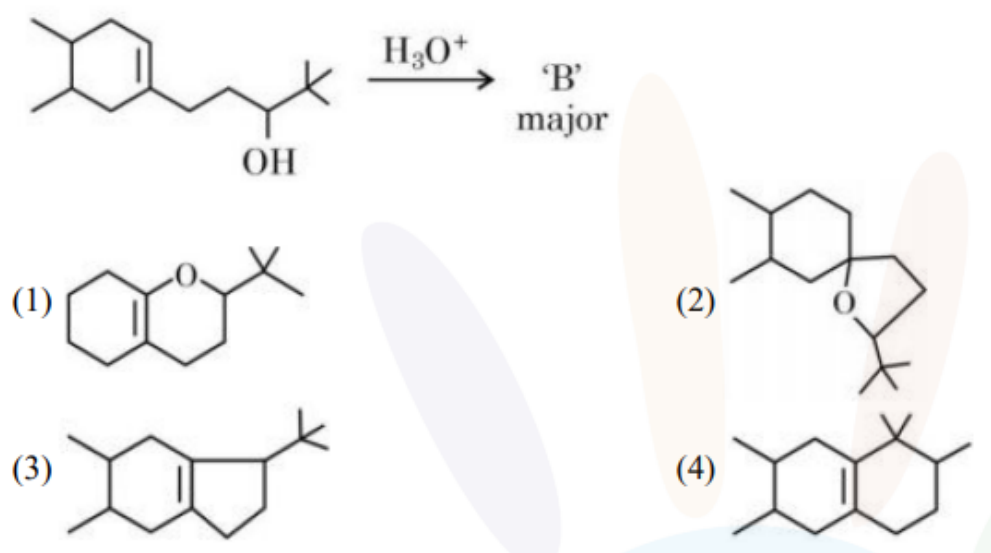
Options:

- (1) Be^{2+}
- (2) Ba^{2+}
- (3) Ca^{2+}
- (4) Sr^{2+}

10. The strongest acid from the following is:



11. In the following reaction, 'B' is:

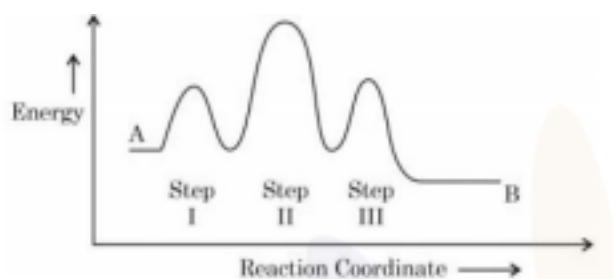


12. Structures of BeCl_2 in solid state, vapor phase and at very high temperature respectively are:

Options:

- (1) Polymeric, Dimeric, Monomeric
- (2) Dimeric, Polymeric, Monomeric
- (3) Monomeric, Dimeric, Polymeric
- (4) Polymeric, Monomeric, Dimeric

13. Consider the following reaction that goes from A to B in three steps as shown below:



14. The product, which is not obtained during the electrolysis of brine solution is:

Options:

- (1) HCl
- (2) NaOH
- (3) Cl_2
- (4) H_2

15. Which one of the following elements will remain as liquid inside pure boiling water?

Options:

- (1) Li
- (2) Ga
- (3) Cs
- (4) Br

16. Given below are two statements: one is labelled as "Assertion A" and the other is labelled as "Reason R":

Assertion A: In the complex Ni(CO)_4 and Fe(CO)_5 , the metals have zero oxidation state.

Reason R: Low oxidation states are found when a complex has ligands capable of π -donor character in addition to the σ -bonding.

Options:

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

17. Given below are two statements:

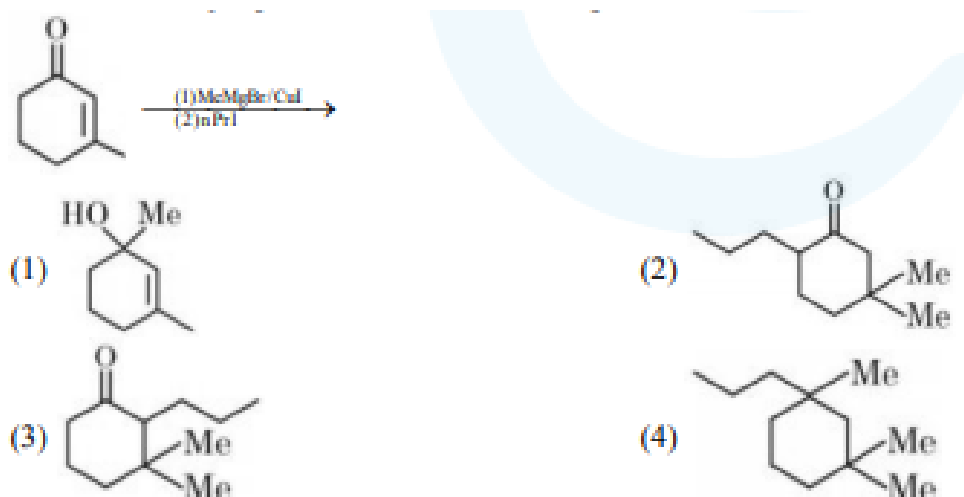
Statement I: Morphine is a narcotic analgesic. It helps in relieving pain without producing sleep.

Statement II: Morphine and its derivatives are obtained from opium poppy.

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

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

18. Find out the major product from the following reaction:



19. During the reaction of permanganate with thiosulphate, the change in oxidation of manganese occurs by a value of 3. Identify which of the below medium will favour the reaction:

Options:

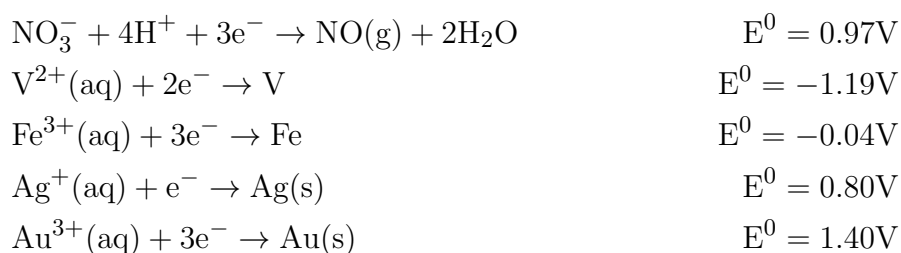
- (1) aqueous neutral
- (2) aqueous acidic
- (3) both aqueous acidic and neutral
- (4) both aqueous acidic and faintly alkaline

20. Element not present in Nessler's reagent is:

Options:

- (1) K
- (2) N
- (3) I
- (4) Hg

21. The standard reduction potentials at 298 K for the following half cells are given below:



The number of metal(s) which will be oxidized by NO in aqueous solution is

22. Number of crystal systems from the following where body-centred unit cell can be found is:

Cubic, tetragonal, orthorhombic, hexagonal, rhombohedral, monoclinic, triclinic.

23. Among the following, the number of compounds which will give a positive iodoform reaction is:

- (a) 1-Phenylbutan-2-one
 - (b) 2-Methylbutan-2-ol
 - (c) 3-Methylbutan-2-ol
 - (d) 1-Phenylethanol
 - (e) 3,3-dimethylbutan-2-one
 - (f) 1-Phenylpropan-2-ol
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24. Number of isomeric aromatic amines with molecular formula $C_8H_{11}N$, which can be synthesized by Gabriel Phthalimide synthesis is ____

25. Consider the following pairs of solutions which will be isotonic at the same temperature. The number of pairs of solutions is/are:

Options:

- 1. (A) 1 M aq. NaCl and 2 M aq. Urea
 - 2. (B) 1 M aq. $CaCl_2$ and 1.5 M aq. KCl
 - 3. (C) 1.5 M aq. $AlCl_3$ and 2 M aq. Na_2SO_4
 - 4. (D) 2.5 M aq. KCl and 1 M aq. $Al_2(SO_4)_3$
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26. The number of colloidal systems from the following, which will have 'liquid' as the dispersion medium, is:

Gem stones, paints, smoke, cheese, milk, hair cream, insecticide sprays, froth, soap lather

27. In an ice crystal, each water molecule is hydrogen bonded to _____ neighboring molecules.

28. Consider the following data:

Heat of combustion of $H_2(g) = -241.8 \text{ kJ mol}^{-1}$

Heat of combustion of $C(s) = -393.5 \text{ kJ mol}^{-1}$

Heat of combustion of $C_2H_5OH(l) = -1234.7 \text{ kJ mol}^{-1}$

The heat of formation of $C_2H_5OH(l)$ is $(-)\text{-----} \text{ kJ mol}^{-1}$ (Nearest integer).

29. The equilibrium composition for the reaction $PCl + Cl \rightarrow PCl_5$ at 298 K is given below:

$$PCl_3 \text{ }_{eq} = 0.2 \text{ mol L}^{-1}$$

$$\text{Cl}_2 \text{ }_{eq} = 0.1 \text{ mol L}^{-1}$$

$$\text{PCl}_5 \text{ }_{eq} = 0.40 \text{ mol L}^{-1}$$

If 0.2 mol of Cl_2 is added at the same temperature, the equilibrium concentration of PCl_5 is _____ $\times 10^2 \text{ mol L}^{-1}$.

30. The number of species having a square planar shape from the following is $\text{XeF}_4, \text{SF}_4, \text{SiF}_4, \text{BF}_4^-, \text{BrF}_4^-, [\text{Cu}(\text{NH}_3)_4]^{2+}, [\text{FeCl}_4]^-, [\text{PtCl}_4]^{2-}$