

JEE Main 2023 Apr 13 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:

- (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.

SECTION-A

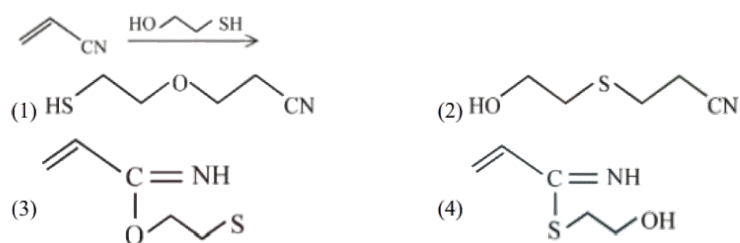
1. Which of the following are the greenhouse gases?

- (A) Water vapour
- (B) Ozone
- (C) I_2
- (D) Molecular hydrogen

Choose the most appropriate answer from the options given below:

- (1) C and D only
 - (2) A and B only
 - (3) B and C only
 - (4) A and D only
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2. The major product for the following reaction is:

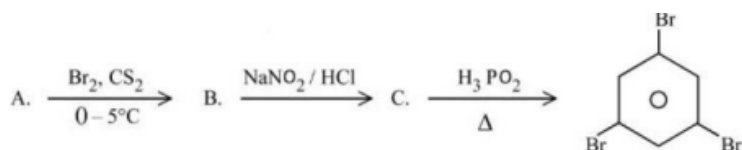


- (1) HS- compound
 - (2) HO- compound
 - (3) Compound with oxygen and sulfur
 - (4) Another possible product configuration
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3. In the wet tests for detection of various cations by precipitation, Ba^{2+} cations are detected by obtaining precipitate of:

- (1) $Ba(OAc)_2$
 - (2) $BaCO_3$
 - (3) $BaSO_4$
 - (4) $Ba(ox)$: Barium oxalate
-

4. Compound A from the following reaction sequence is:



- (1) Phenol
 - (2) Benzoic Acid
 - (3) Aniline
 - (4) Salicylic Acid
-

5. Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: Isotopes of hydrogen have almost the same chemical properties, but differ in their rates of reaction.

Reason R: Isotopes of hydrogen have different enthalpy of bond dissociation.

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

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

6. Given below are statements related to the Ellingham diagram:

Statement I: Ellingham diagram can be constructed for oxides, sulfides, and halides of metals.

Statement II: It consists of plots of ΔH° vs T for the formation of oxides of elements.

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

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

7. Better method for preparation of BeF_2 , among the following is:

- (1) $\text{BeH}_2 + \text{F}_2 \xrightarrow{\Delta} \text{BeF}_2$
 - (2) $\text{Be} + \text{F}_2 \xrightarrow{\Delta} \text{BeF}_2$
 - (3) $(\text{NH}_4)_2\text{BeF}_4 \xrightarrow{\Delta} \text{BeF}_2 + \text{NH}_3\text{F}$
 - (4) $\text{BeO} + \text{C} + \text{F}_2 \xrightarrow{\Delta} \text{BeF}_2$
-

8. Identify the correct order of standard enthalpy of formation of sodium halides:

- (1) $\text{NaI} < \text{NaBr} < \text{NaF} < \text{NaCl}$
- (2) $\text{NaF} < \text{NaCl} < \text{NaBr} < \text{NaI}$
- (3) $\text{NaCl} < \text{NaF} < \text{NaBr} < \text{NaI}$

(4) $\text{NaI} < \text{NaBr} < \text{NaCl} < \text{NaF}$

9. Which of the following complexes will exhibit maximum attraction to an applied magnetic field?

- (1) $[\text{Zn}(\text{H}_2\text{O})_6]^{2+}$
 - (2) $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$
 - (3) $[\text{Co}(\text{en})_3]^{3+}$
 - (4) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
-

10. The correct group of halide ions which can be oxidized by oxygen in acidic medium is:

- (1) Cl^- , Br^- , and I^- only
 - (2) Br^- only
 - (3) Br^- and I^- only
 - (4) I^- only
-

11. The total number of stereoisomers for the complex $[\text{Cr}(\text{ox})_2\text{ClBr}]^{3-}$ (where ox = oxalate) is:

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

12. Match List I with List II:

I – Bromopropane is reacted with reagents in List I to give products in List II.

LIST I-Reagent	LIST II – Product
A. KOH (alc)	I. Nitrile
B. KCN (alc)	II. Ester
C. AgNO_2	III. Alkene
D. H_3CCOOAg	IV. Nitroalkane

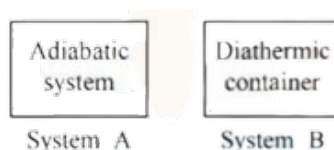
Choose the correct answer from the options given below:

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

13. The covalency and oxidation state respectively of boron in $[BF_4]^-$ are:

- (1) 3 and 5
- (2) 4 and 3
- (3) 4 and 4
- (4) 3 and 4

14. What happens when methane undergoes combustion in systems A and B respectively?



(1)

System A	System B
Temperature remains same	Temperature rises

(2)

System A	System B
Temperature falls	Temperature rises

(3)

System A	System B
Temperature falls	Temperature remains same

(4)

System A	System B
Temperature rises	Temperature remains same

15. The naturally occurring amino acid that contains only one basic functional group in its chemical structure is:

- (1) Histidine
 - (2) Lysine
 - (3) Asparagine
 - (4) Arginine
-

16. Given below are two statements:

Statement I: SO_2 and H_2O both possess V-shaped structures.

Statement II: The bond angle of SO_2 is less than that of H_2O .

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

- (1) Both Statements I and Statement II are incorrect
 - (2) Both Statement I and Statement II are correct
 - (3) Statement I is correct but Statement II is incorrect
 - (4) Statement I is incorrect but Statement II is correct
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17. Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: The diameter of colloidal particles in solution should not be much smaller than the wavelength of light to show Tyndall effect.

Reason R: The light scatters in all directions when the size of particles is large enough.

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

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

78. Match List I with List II:

LIST I	LIST II
A. Weak intermolecular forces of attraction	I. Hexamethylenediamine + adipic
B. Hydrogen bonding	II. $\text{AlEt}_3 + \text{TiCl}_4$
C. Heavily branched polymer	III. 2-chloro -1, 3 - butadiene
D. High density polymer	IV. Phenol + formaldehyde

Choose the correct answer from the options given below:

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

19. Given below are two statements:

Statement I: Tropolone is an aromatic compound and has 8 π electrons.

Statement II: π electrons of $> \text{C} = \text{O}$ group in tropolone are involved in aromaticity.

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

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

20. Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: Order of acidic nature of the following compounds is $A > B > C$.

Reason R: Fluoro is a stronger electron withdrawing group than Chloro group.

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

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

SECTION-B

21. If the formula of Borax is $\text{Na}_2\text{B}_4\text{O}_x(\text{OH})_y \cdot z\text{H}_2\text{O}$, then $x + y + z = \text{-----}$.

22. Sea water contains 29.25% NaCl and 19% MgCl_2 by weight of solution. The normal boiling point of the sea water is $\text{-----}^\circ\text{C}$ (Nearest integer).

Assume 100% ionization for both NaCl and MgCl_2 .

Given: $K_b(\text{H}_2\text{O}) = 0.52 \text{ K kg mol}^{-1}$,

Molar mass of NaCl and MgCl_2 are 58.5 g mol^{-1} and 95 g mol^{-1} , respectively.

23. 20 mL of 0.1 M NaOH is added to 50 mL of 0.1 M acetic acid solution. The pH of the resulting solution is $\text{-----} \times 10^{-2}$ (Nearest integer).

Given:

$\text{p}K_a(\text{CH}_3\text{COOH}) = 4.76$

$\log 2 = 0.30$

$\log 3 = 0.48$

24. At 298 K, the standard reduction potential for Cu^{2+}/Cu electrode is 0.034 V.

Given: $K_{\text{sp}} \text{Cu}(\text{OH})_2 = 1 \times 10^{-20}$

Take $\frac{2.303RT}{F} = 0.059 \text{ V}$.

The reduction potential at pH = 14 for the above couple is $(-)x \times 10^{-2} \text{ V}$.

The value of x is ----- .

25. Sodium metal crystallizes in a body-centered cubic lattice with unit cell edge length of 4 Å. The radius of sodium atom is _____ $\times 10^{-1}$ Å (Nearest integer).

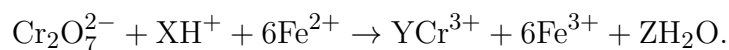
26. $A(g) \rightarrow 2B(g) + C(g)$ is a first-order reaction. The initial pressure of the system was found to be 800 mm Hg, which increased to 1600 mm Hg after 10 minutes. The total pressure of the system after 30 minutes will be _____ mm Hg (Nearest integer).

27. 1 g of a carbonate (M_2CO_3) on treatment with excess HCl produces 0.01 mol of CO_2 . The molar mass of M_2CO_3 is _____ g mol⁻¹ (Nearest integer).

28. 0.400 g of an organic compound (X) gave 0.376 g of AgBr in Carius method for estimation of bromine. % of bromine in the compound (X) is _____ (Given: Molar mass of AgBr = 188 g mol⁻¹, Br = 80 g mol⁻¹).

29. The orbital angular momentum of an electron in the 3s orbital is $\frac{xh}{2\pi}$. The value of x is ____ (nearest integer).

30. See the following chemical reaction:



The sum of X , Y , and Z is _____.
