

JEE Main 2023 Chemistry Question Paper Jan 24 Shift 2

Time Allowed :3 Hour	Maximum Marks :120	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 30 questions. The maximum marks are 120.
3. The question paper consists of topics from Chemistry, having 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. 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. Which one amongst the following are good oxidizing agents?

- A. Sm^{2+}
B. Ce^{2+}
C. Ce^{4+}
D. Tb^{4+}

Choose the most appropriate answer from the options given below:

- (A) C and D only
(B) A and B only
(C) D only
(D) C only

2. Which of the following cannot be explained by crystal field theory?

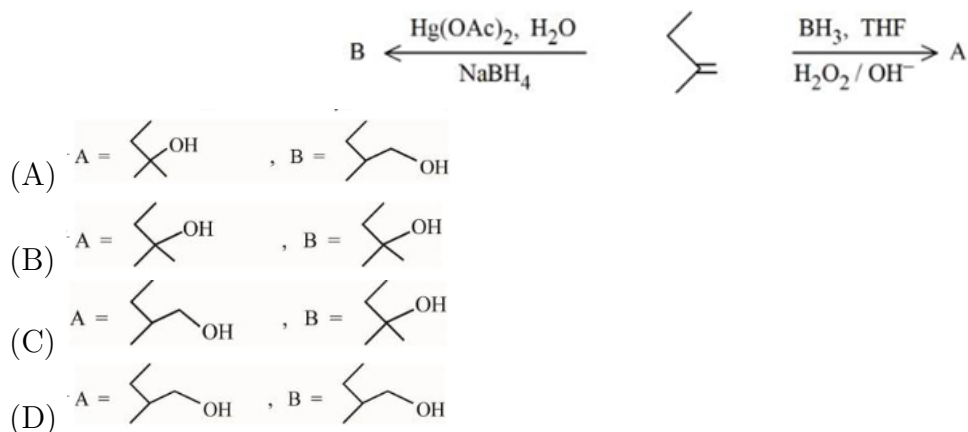
- (A) The order of spectrochemical series
(B) Magnetic properties of transition metal complexes
(C) Colour of metal complexes
(D) Stability of metal complexes

3. $\text{K}_2\text{Cr}_2\text{O}_7$ paper acidified with dilute H_2SO_4 turns green when exposed to

- (A) Sulphur dioxide
(B) Carbon dioxide

- (C) Sulphur trioxide
(D) Hydrogen sulphide
-

4. Find out the major products from the following reactions.



5. Identify the correct statements about alkali metals.

- A. The order of standard reduction potential ($M^+|M$) for alkali metal ions is $\text{Na} > \text{Rb} > \text{Li}$.
B. CsI is highly soluble in water.
C. Lithium carbonate is highly stable to heat.
D. Potassium dissolved in concentrated liquid ammonia is blue in colour and paramagnetic.
E. All the alkali metal hydrides are ionic solids.

Choose the correct answer from the options given below:

- (A) C and E only
(B) A, B, D only
(C) A, B and E only
(D) A and E only
-

6. In which of the following reactions the hydrogen peroxide acts as a reducing agent?

- (A) $\text{HOCl} + \text{H}_2\text{O}_2 \rightarrow \text{H}_3\text{O}^+ + \text{Cl}^- + \text{O}_2$
(B) $\text{Mn}^{2+} + \text{H}_2\text{O}_2 \rightarrow \text{Mn}^{4+} + 2\text{OH}^-$
(D) $\text{PbS} + 4\text{H}_2\text{O}_2 \rightarrow \text{PbSO}_4 + 4\text{H}_2\text{O}$
-

7. The metal which is extracted by oxidation and subsequent reduction from its ore is:

- (A) Al
 - (B) Cu
 - (C) Ag
 - (D) Fe
-

8. Given below are two statements:

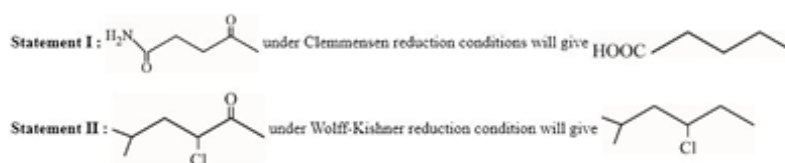
Statement I : Pure Aniline and other arylamines are usually colourless.

Statement II : Arylamines get coloured on storage due to atmospheric reduction.

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

- (A) Both Statement I and Statement II are incorrect
 - (B) Statement I is incorrect but Statement II is correct
 - (C) Statement I is correct but Statement II is incorrect
 - (D) Both Statement I and Statement II are correct
-

9. Given below are two statements:



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

- (A) Statement I is false but Statement II is true
 - (B) Statement I is true but Statement II is false
 - (C) Both Statement I and Statement II are false
 - (D) Both Statement I and Statement II are true
-

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

Assertion A : Beryllium has less negative value of reduction potential compared to the other alkaline earth metals.

Reason R : Beryllium has large hydration energy due to small size of Be^{2+} but relatively large value of atomization enthalpy.

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

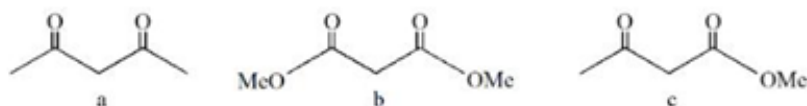
- (A) Both A and R are correct and R is the correct explanation of A
- (B) Both A and R are correct but R is NOT the correct explanation of A

- (C) A is correct but R is not correct
(D) A is not correct but R is correct
-

11. Correct statement is:

- (A) An average human being consumes more food than air
(B) An average human being consumes equal amount of food and air
(C) An average human being consumes 100 times more air than food
(D) An average human being consumes nearly 15 times more air than food
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12. Which will undergo deprotonation most readily in basic medium?



- (A) a only
(B) b only
(C) Both a and c
(D) c only
-

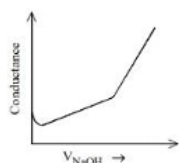
13. Match List I with List II

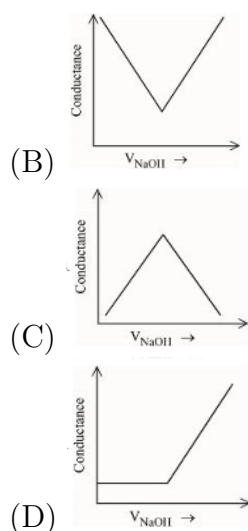
LIST I (Type)		LIST II (Name)	
A.	Antifertility drug	I.	Norethindrone
B.	Tranquilizer	II.	Meprobamate
C.	Antihistamine	III.	Seldane
D.	Antibiotic	IV.	Ampicillin

Choose the correct answer from the options given below:

- (A) A-I, B-III, C-II, D-IV
(B) A-I, B-II, C-III, D-IV
(C) A-II, B-I, C-III, D-IV
(D) A-IV, B-III, C-II, D-I
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14. Choose the correct representation of conductometric titration of benzoic acid vs sodium hydroxide.





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

Assertion A : Benzene is more stable than hypothetical cyclohexatriene

Reason R : The delocalized π electron cloud is attracted more strongly by nuclei of carbon atoms.

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

- (A) A is false but R is true
- (B) Both A and R are correct but R is NOT the correct explanation of A
- (C) A is true but R is false
- (D) Both A and R are correct and R is the correct explanation of A

16. The number of s-electrons present in an ion with 55 protons in its unipositive state is

- (A) 10
- (B) 9
- (C) 12
- (D) 8

17. The hybridization and magnetic behaviour of cobalt ion in $[Co(NH_3)_6]^{3+}$ complex, respectively is

- (A) sp^3d^2 and paramagnetic
- (B) d^2sp^3 and paramagnetic
- (C) d^2sp^3 and diamagnetic
- (D) sp^3d^2 and diamagnetic

18. A student has studied the decomposition of a gas AB_3 at $25^\circ C$. He obtained the following data:

p (mm Hg)	50	100	200	400
relative $t_{1/2}$ (s)	4	2	1	0.5

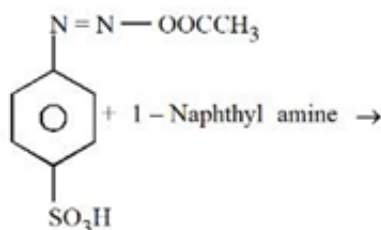
The order of the reaction is

- (A) 2
- (B) 0.5
- (C) 0 (zero)
- (D) 1

19. What is the number of unpaired electron(s) in the highest occupied molecular orbital of the following species : N_2 ; N_2^+ ; O_2 ; O_2^+ ?

- (A) 2, 1, 0, 1
- (B) 0, 1, 0, 1
- (C) 0, 1, 2, 1
- (D) 2, 1, 2, 1

20. Choose the correct colour of the product for the following reaction.



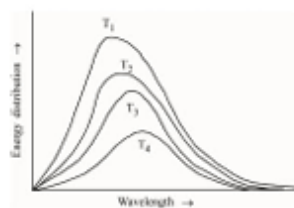
- (A) Blue
- (B) Red
- (C) Yellow
- (D) White

21. Sum of π - bonds present in peroxodisulphuric acid and pyrosulphuric acid is -----

22. The number of units, which are used to express concentration of solutions from the following is -----

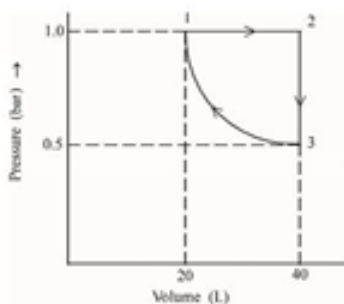
23. Maximum number of isomeric monochloro derivatives which can be obtained from 2,2,5,5-tetramethylhexane by chlorination is _____

24. Following figure shows spectrum of an ideal black body at four different temperatures. The number of correct statement/s from the following is _____



- A. $T_4 > T_3 > T_2 > T_1$
 - B. The black body consists of particles performing simple harmonic motion.
 - C. The peak of the spectrum shifts to shorter wavelength as temperature increases.
 - D. $\frac{T_1}{\nu_1} = \frac{T_2}{\nu_2} = \frac{T_3}{\nu_3} \neq \text{constant}$
 - E. The given spectrum could be explained using quantisation of energy.
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25. One mole of an ideal monoatomic gas is subjected to changes as shown in the graph. The magnitude of the work done (by the system or on the system) is _____J (nearest integer)

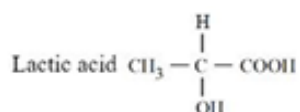


Given : $\log 2 = 0.3$, $\ln 10 = 2.3$

26. Total number of tripeptides possible by mixing of valine and proline is _____

27. The total pressure observed by mixing two liquids A and B is 350 mm Hg when their mole fractions are 0.7 and 0.3 respectively. The total pressure becomes 410 mm Hg if the mole fractions are changed to 0.2 and 0.8 respectively for A and B. The vapour pressure of pure A is _____mm Hg. (Nearest integer)
Consider the liquids and solutions behave ideally.

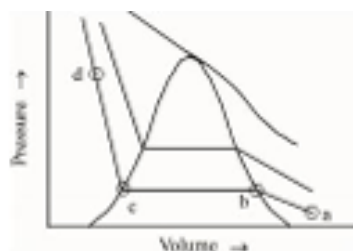
28. If the pK_a of lactic acid is 5, then the pH of 0.005 M calcium lactate solution at 25°C is _____ $\times 10^{-1}$ (Nearest integer)



29. The number of statement/s which are the characteristics of physisorption is _____

- A. It is highly specific in nature
 - B. Enthalpy of adsorption is high
 - C. It decreases with increase in temperature
 - D. It results into unimolecular layer
 - E. No activation energy is needed
-

30. The number of statement/s, which are correct with respect to the compression of carbon dioxide from point (a) in the Andrews isotherm from the following is _____



- A. Carbon dioxide remains as a gas upto point (b)
 - B. Liquid carbon dioxide appears at point (c)
 - C. Liquid and gaseous carbon dioxide coexist between points (b) and (c)
 - D. As the volume decreases from (b) to (c), the amount of liquid decreases
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