JEE Main 2023 Chemistry Question Paper Apr 8 Shift 1

Time Allowed :3 Hour	Maximum Marks :120	Total Questions :30

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. $2IO_3^- + xI^- + 12H^+ \rightarrow 6I_2 + 6H_2O$
What is the value of x?

(A) 2
(B) 10
(C) 6
(D) 12

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2. The reaction
$\frac{1}{2}H_2(g) + AgCl(s) \rightleftharpoons H^+(aq) + Cl^-(aq) + Ag(s)$
occurs in which of the given galvanic cell.

(A) $Ag|AgCl(s)|KCl(sol^n)|AgNO_3|Ag$
(B) $Pt|H_2(g)|HCl(sol^n)|AgNO_3(sol^n)|Ag$
(C) $Pt|H_2(g)|HCl(sol^n)|AgCl(s)|Ag$
(D) $Pt|H_2(g)|KCl(sol^n)|AgCl(s)|Ag$

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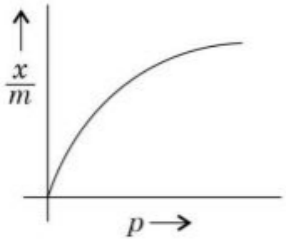
3. Which of the following represent the Freundlich adsorption isotherms?

A.



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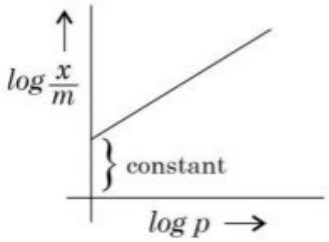
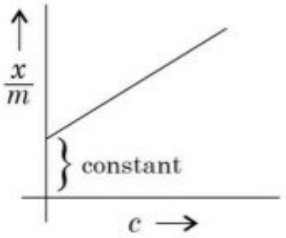
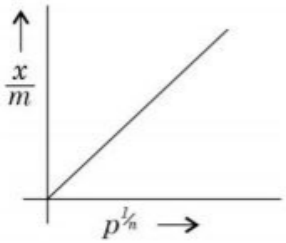


C.



D.



(A) A, B only
(B) B, C, D only
(C) A, B, D only
(D) A, C, D only

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4. The correct order of electronegativity for given elements is:

(A) C > P > At > Br
(B) Br > C > At > P
(C) P > Br > C > At
(D) Br > P > At > C

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5. Which of the following metals can be extracted through alkali leaching technique?

(A) Au

(B) Cu
(C) Pb
(D) Sn

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6. The water gas on reacting with cobalt as a catalyst forms:

(A) Methanal
(B) Methanol
(C) Methanoic acid
(D) Ethanol

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7. What is the purpose of adding gypsum to cement?

(A) To give a hard mass
(B) To facilitate the hydration of cement
(C) To slow down the process of setting
(D) To speed up the process of setting

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8. Given below are two statements:
Statement I: Lithium and Magnesium do not form superoxide
Statement II: The ionic radius of Li^+ is larger than ionic radius of Mg^{2+}
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 correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

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9. Which halogen is known to cause the reaction given below:
$2Cu^{2+} + 4X^- \rightarrow Cu_2X_2(s) + X_2$

(A) All halogens
(B) Only Iodine
(C) Only Bromine
(D) Only Chlorine

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10. Which of the following complex is octahedral, diamagnetic and the most stable?

(A) $K_3[Co(CN)_6]$
(B) $[Co(H_2O)_6]Cl_2$
(C) $[Ni(NH_3)_6]Cl_2$
(D) $Na_3[CoCl_6]$

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11. Match List I with List II:

List I (Species)	List II (Maximum allowed concentration in ppm in drinking water)
A. F^-	I. < 50 ppm
B. SO_4^{2-}	II. < 5 ppm
C. NO_3^-	III. < 2 ppm
D. Zn	IV. < 500 ppm

Choose the correct answer from the options given below:

(A) A-I, B-II, C-III, D-IV
(B) A-IV, B-III, C-II, D-I
(C) A-II, B-I, C-III, D-IV
(D) A-III, B-II, C-I, D-IV

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12. The correct order of spin only magnetic moments for the following complex ions is:

(A) $[Fe(CN)_6]^{3-} < [CoF_6]^{3-} < [MnBr_4]^{2-} < [Mn(CN)_6]^{3-}$
(B) $[Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-} < [CoF_6]^{3-} < [MnBr_4]^{2-}$
(C) $[CoF_6]^{3-} < [MnBr_4]^{2-} < [Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-}$
(D) $[MnBr_4]^{2-} < [CoF_6]^{3-} < [Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-}$

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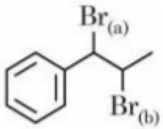
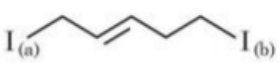
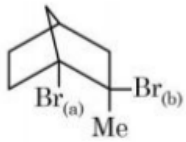
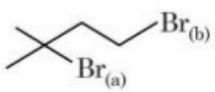
13. Choose the halogen which is most reactive towards S_N1 reaction in the given compounds (A, B, C & D):

A.


B.


C.


D.


(A) A - $Br_{(a)}$; B - $I_{(a)}$; C - $Br_{(b)}$; D - $Br_{(b)}$
(B) A - $Br_{(b)}$; B - $I_{(a)}$; C - $Br_{(b)}$; D - $Br_{(a)}$
(C) A - $Br_{(b)}$; B - $I_{(b)}$; C - $Br_{(a)}$; D - $Br_{(a)}$
(D) A - $Br_{(b)}$; B - $I_{(b)}$; C - $Br_{(b)}$; D - $Br_{(b)}$

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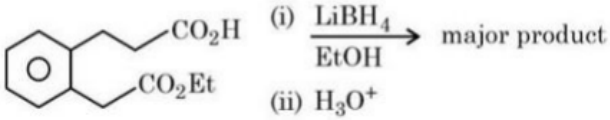
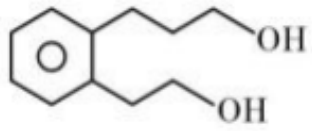
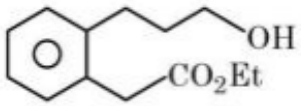
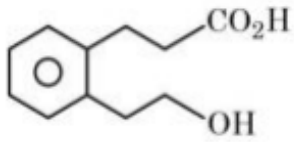
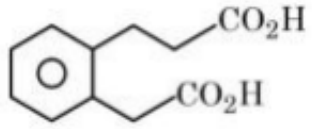
14. The major product formed in the following reaction is:



(A)


(B)


(C)


(D)


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15. Given below are two statements: One is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: Butan-1-ol has higher boiling point than ethoxyethane.
Reason R: Extensive hydrogen bonding leads to stronger association of molecules.
In the light of the above statements, choose the correct answer from the options given below:

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

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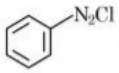
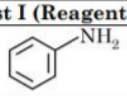
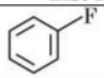
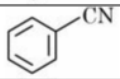
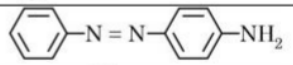
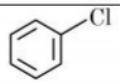
16. Match List I with List II:



is reacted with reagents in List I to form products in List II.

List I (Reagent)	List II (Product)
A. 	I. 
B. HBF_4, Δ	II. 
C. Cu, HCl	III. 
D. CuCN / KCN	IV. 

Choose the correct answer from the options given below:

(A) A-IV, B-III, C-II, D-I
(B) A-III, B-I, C-IV, D-II
(C) A-I, B-III, C-IV, D-II
(D) A-III, B-I, C-II, D-IV

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17. Sulphur (S) containing amino acids from the following are:
(a) isoleucine (b) cysteine (c) lysine (d) methionine (e) glutamic acid

(A) a, b, c
(B) b, d
(C) b, c, e
(D) a, d

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18. Match List I with List II:

List I		List II	
A.	Saccharin	I.	High potency sweetener
B.	Aspartame	II.	First artificial sweetening agent
C.	Alitame	III.	Stable at cooking temperature
D.	Sucralose	IV.	Unstable at cooking temperature

Choose the correct answer from the options given below:

(A) A-II, B-IV, C-I, D-III
(B) A-II, B-IV, C-III, D-I
(C) A-II, B-III, C-IV, D-I
(D) A-IV, B-III, C-I, D-II

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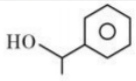
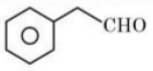
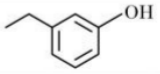
19. Match List I with List II:

List I (Reagents used)	List II (Compound with Functional group detected)
A. Alkaline solution of copper sulphate and sodium citrate	I. 
B. Neutral $FeCl_3$ solution	II.
C. Alkaline chloroform solution	III. 
D. Potassium iodide and sodium hypochlorite	IV. 

Choose the correct answer from the options given below:

(A) A-II, B-IV, C-III, D-I
(B) A-IV, B-I, C-II, D-III
(C) A-III, B-IV, C-I, D-II
(D) A-III, B-I, C-II, D-IV

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20. In chromyl chloride, the number of d-electrons present on chromium is same as in (Given at no. of Ti : 22, V : 23, Cr : 24, Mn : 25, Fe : 26):

(A) Mn (VII)
(B) Fe (III)
(C) V (IV)
(D) Ti (III)

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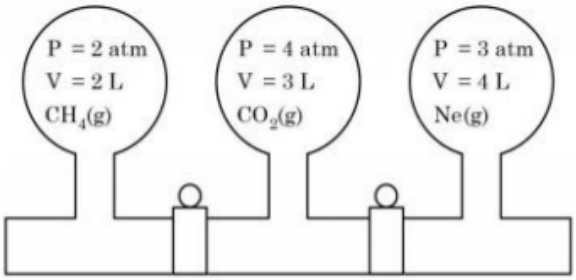
21. Three bulbs are filled with CH_4, CO_2 and Ne as shown in the picture. The bulbs are connected through pipes of zero volume. When the stopcocks are opened and the temperature is kept constant throughout, the pressure of the system is found to be _____ atm. (Nearest integer)



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22. The number of following statement/s which is/are incorrect is _____
(A) Line emission spectra are used to study the electronic structure
(B) The emission spectra of atoms in the gas phase show a continuous spread of wavelength from red to violet
(C) An absorption spectrum is like the photographic negative of an emission spectrum
(D) The element helium was discovered in the sun by spectroscopic method

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23. The number of following factors which affect the percent covalent character of the ionic bond is _____
(A) Polarising power of cation
(B) Extent of distortion of anion
(C) Polarisability of the anion
(D) Polarising power of anion

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24. When a 60 W electric heater is immersed in a gas for 100 s in a constant volume container with adiabatic walls, the temperature of the gas rises by $5^{\circ}C$. The heat capacity of the given gas is _____ $J \cdot K^{-1}$ (Nearest integer)

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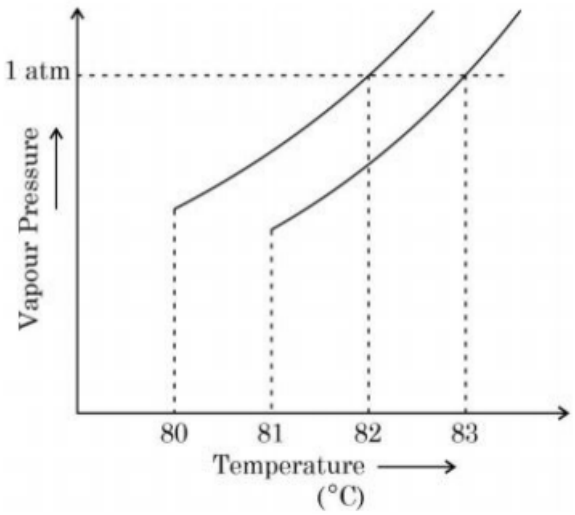
25. The vapour pressure vs. temperature curve for a solution solvent system is shown below.



The boiling point of the solvent is _____ $^{\circ}C$.

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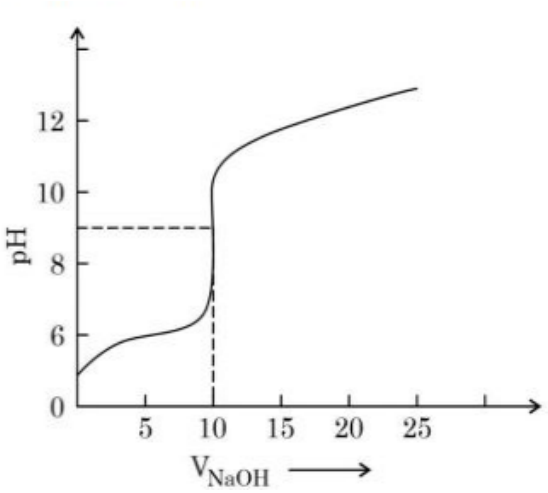
26. The titration curve of weak acid vs. strong base with phenolphthalein as indicator is shown below. The $K_{phenolphthalein} = 4 \times 10^{-10}$.



The number of following statement/s which is/are correct about phenolphthalein is _____
A. It can be used as an indicator for the titration of weak acid with weak base.
B. It begins to change colour at $pH = 8.4$.
C. It is a weak organic base.
D. It is colourless in acidic medium.

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27. The number of given statement/s which is/are correct is _____
(A) The stronger the temperature dependence of the rate constant, the higher is the activation energy.
(B) If a reaction has zero activation energy, its rate is independent of temperature.
(C) The stronger the temperature dependence of the rate constant, the smaller is the activation energy.
(D) If there is no correlation between the temperature and the rate constant then it means that the reaction has negative activation energy.

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28. XeF_4 reacts with SbF_5 to form
$[XeF_m]^n[SbF_y]^z$.
$m + n + y + z =$ _____

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29. Molar mass of the hydrocarbon (X) which on ozonolysis consumes one mole of O_3 per mole of (X) and gives one mole each of ethanal and propanone is _____ $g \cdot mol^{-1}$ (Molar mass of C : 12 $g \cdot mol^{-1}$, H : 1 $g \cdot mol^{-1}$)

30. 0.5 g of an organic compound (X) with 60% carbon will produce _____ $\times 10^{-1}$ g of CO_2 on complete combustion.