



JEE Main Online Exam 2019

Questions & Solutions

9th April 2019 | Shift - II

CHEMISTRY

- Q.1** The maximum number of possible oxidation states of actinoides are shown by :
- (1) nobelium (No) and lawrencium (Lr) (2) neptunium (Np) and lawrencium (Pu)
 (3) actinium (Ac) and thorium (Th) (4) berkelium (Bk) and californium (Cf)

Ans. [2]

Sol.

| | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Ac | Th | P | U | Np | Pu | An | Cm | Bk | Cf | Es | Fm | Md |
| 3 | | 3 | +3 | +3 | +3 | +3 | +3 | +3 | +3 | +3 | +3 | +3 |
| | 4 | +4 | +4 | +4 | +4 | +4 | 4 | 4 | | | | |
| | | 5 | +5 | +5 | +5 | +5 | | | | | | |
| | | | 6 | +6 | +6 | +6 | | | | | | |
| | | | | 7 | 7 | | | | | | | |

∴ Np and Pu has maximum $\frac{N_o \quad L_r}{\text{no. of}} \frac{+3 \quad +3}{}$

Possible O.S.

- Q.2** In the following reaction carbonyl compound + MeOH $\xrightleftharpoons{\text{HCl}}$ acetal Rate of the reaction is the highest for :
- (1) Propanal as substrate and methanol in stoichiometric amount
 (2) Propanal as substrate and methanol in excess
 (3) Acetone as substrate and methanol in stoichiometric amount
 (4) Acetone as substrate and methanol in excess

Ans. [2]

Sol. Ketones < Aldehydes → Rate of NAR

Only aldehydes are responsible for the function of acetals.

- Q.3** Among the following species, the diamagnetic molecule is :
- (1) NO (2) O₂ (3) CO (4) B₂

Ans. [3]

Sol. CO is diamagnetic in nature

∴ Ans. = 3

Q.4 The correct statements among I to III regarding group 13 element oxides are,

- (I) Boron trioxide is acidic.
- (II) Oxides of aluminium and gallium are amphoteric.
- (III) Oxides of indium and thallium are basic.

- (1) (I) and (II) only
- (2) (I) and (III) only
- (3) (II) and (III) only
- (4) (I), (II) and (III) only

Ans. [4]

Sol. B_2O_3 is acidic in nature Al_2O_3 and Ca_2O_3 are amphoteric oxides of In and Tl are basic in nature.
 \therefore And. 4

Q.5 A solution of $Ni(NO_3)_2$ is electrolysed between platinum electrodes using 0.1 Faraday electricity. How many mole of Ni will be deposited at the cathode?

- (1) 0.10
- (2) 0.05
- (3) 0.20
- (4) 0.15

Ans. [2]

Sol. gm E (Ni) = F
 Moles \times V.F. = 0.1
 $x \times 2 = 0.1$
 $x = 0.05$
 $Ni^{+3} + 2e^- \rightarrow Ni$

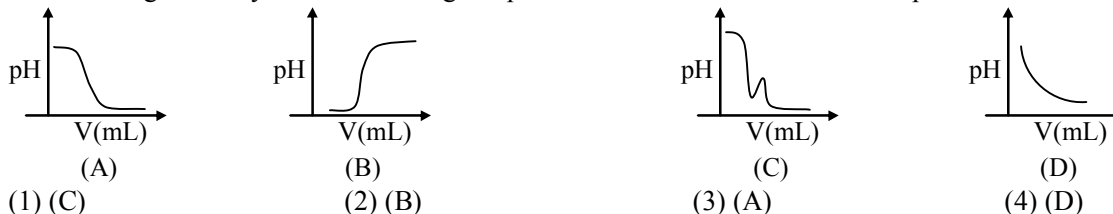
Q.6 Molal depression constant for a solvent is $4.0 K kg mol^{-1}$. The depression in the freezing point of the solvent for $0.03 mol kg^{-1}$ solution of K_2OS_4 is :
 (Assume complete dissociation of the electrolyte)

- (1) 0.36 K
- (2) 0.18 K
- (3) 0.12 K
- (4) 0.24 K

Ans. [1]

Sol. $\Delta T_f = i k_f m$
 $= 3 (4) (0.03)$
 $\Delta T_f = 0.36 K$

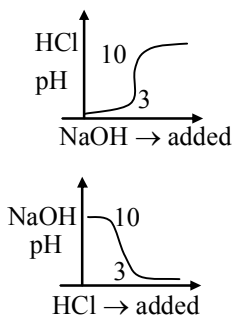
Q.7 In an acid-base titration, 0.1 M HCl solution was added to the NaOH solution of unknown strength. Which of the following correctly shows the change of pH of the titration mixture in this experiment?



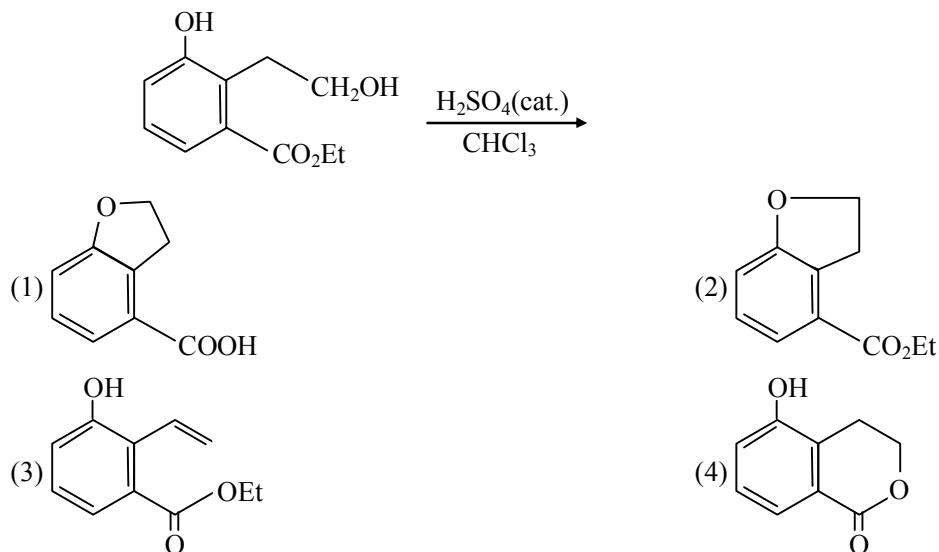
- (1) (C)
- (2) (B)
- (3) (A)
- (4) (D)

Ans. [3]

Sol.

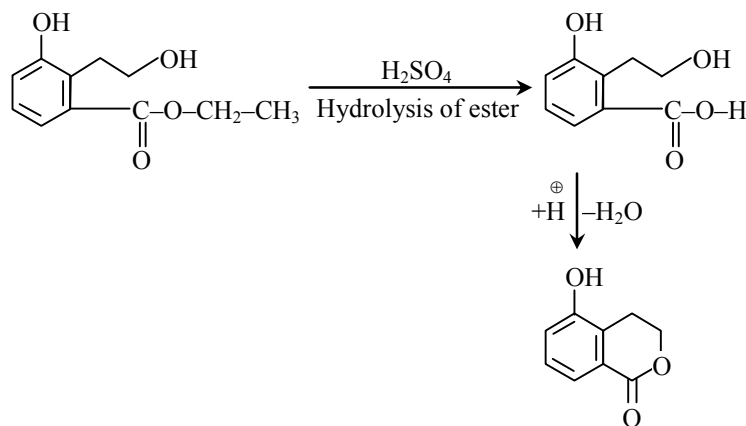


Q.11 The major product of the following reaction is :

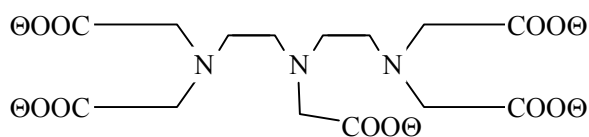


Ans. [4]

Sol.



Q.12 The maximum possible denticities of a ligand given below towards a common transition and inner-transition metal ion, respectively, are :



(1) 6 and 6

(2) 8 and 8

(3) 8 and 6

(4) 6 and 8

Ans. [4]

Sol. General C.No. of CN^- in transition elements is 6 and in inner transition elements is 8 – 12.

\therefore ans. 4

Q.13 Noradrenaline is a / an :

(1) Antacid

(2) Antihistamine

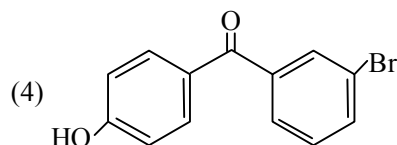
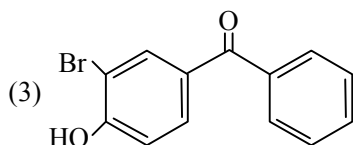
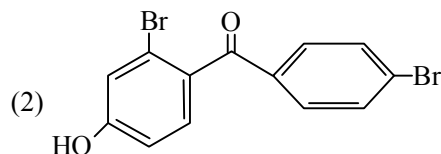
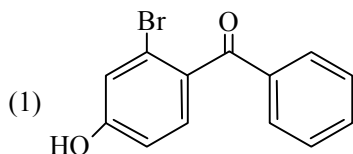
(3) Antidepressant

(4) Neurotransmitter

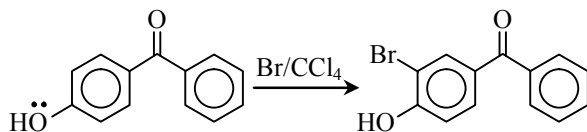
Ans. [4]

Sol. Noradrenaline is a neurotransmitter.

Q.18 p-Hydroxybenzophenone upon reaction with bromine in carbon tetrachloride gives :



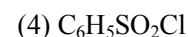
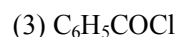
Ans. [3]
Sol.



(M effect)

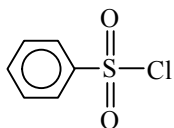
+M effect having group is responsible for activation towards ESR.

Q.19 Hinsberg' reagent is :

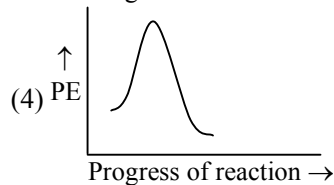
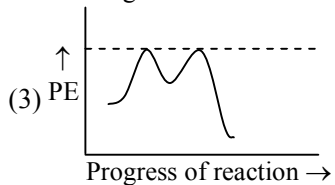
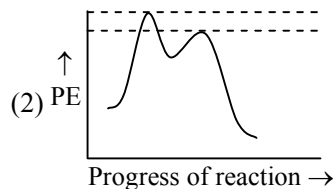
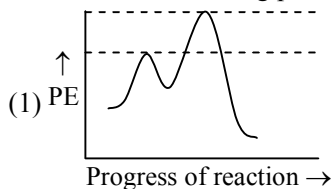


Ans. [4]
Sol.

Benzene sulphonyl chloride

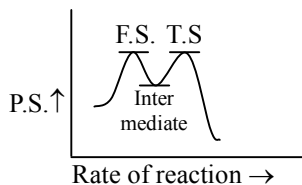


Q.20 Which of the following potential energy (PE) diagrams represents the $\text{S}_{\text{N}}1$ reaction ?



Ans. [2]
Sol.

For $\text{S}_{\text{N}}1$ carbocation is formed.

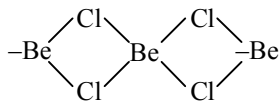


Q.21 The structures of beryllium chloride in the solid state and vapour phase, respectively, are :

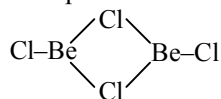
- (1) chain and chain (2) dimeric and dimeric
 (3) dimeric and chain (4) chain and dimeric

Ans. [4]

Sol. Solid state-chain



In vapour state dimeric



Q.22 Assertion : For the extraction of iron, haematite ore is used.

Reason : Haematite is a carbonate ore of iron.

- (1) Both the assertion and reason are correct, but the reason is not the correct explanation for the assertion.
 (2) Both the assertion and reason are correct and the reason is the correct explanation for the assertion.
 (3) Only the reason is correct.
 (4) Only the assertion is correct.

Ans. [4]

Sol. Extraction of Fe is done from Haematite or this is true but reason is wrong as Haematite is Fe_2O_3 .

∴ Ans. 4

Q.23 During compression of a spring the work done is 10 kJ and 2 kJ escaped to the surroundings as heat. The change in internal energy, ΔU (in kJ) is :

- (1) 12 (2) -8 (3) 8 (4) -12

Ans. [3]

Sol. Work done on system = +10 kJ

Heat escaped = -2 kJ

$$\Delta U = q + w$$

$$= 10 - 2 = 8 \text{ kJ.}$$

Q.24 At a given temperature T, gases Ne, Ar, Xe and Kr are found to deviate from ideal gas behaviour. Their

equation of state is given as $P = \frac{RT}{V-b}$ at T.

- (1) Kr (2) Ar (3) Xe (4) Ne

Ans. [3]

Sol.
$$P = \frac{RT}{(V-b)}$$

$$P(V-b) = RT$$

$$\left(P + \frac{a}{V^2} \right) (V-b) = RT$$

At high pressure.

$$P(V-b) = RT$$

$$PV - Pb = RT$$

$$\frac{PV}{RT} - \frac{Pb}{RT} = 1$$

$$Z = 1 + \frac{Pb}{RT}$$

$$Z > 1, Z \propto b$$

- Q.25** The one that is not a carbonate ore is :
 (1) malachite (2) bauxite (3) calamine (4) siderite

Ans. [2]

Sol. Malachite = $\text{CuCO}_3 \cdot \text{Cu(OH)}_2$
 Bauxite = $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ or $\text{AlO}_x \cdot (\text{OH})_{3-2x}$ (where $D < x < 1$)
 Calamine = ZnCO_3
 Siderite = FeCO_3
 \therefore Ans is Bauxite option-2.

- Q.26** The amorphous form of silica is :
 (1) kieselguhr (2) tridymite (3) cristobalite (4) quartz

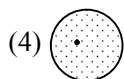
Ans. [1]

Sol. Kieselguhr is amorphous form of silica.
 \therefore Ans. 1

- Q.27** Which one of the following about an electron occupying the 1s orbital in a hydrogen atom is incorrect ? (The Bohr radius is represented by a_0).
 (1) The magnitude of the potential energy is double that of its kinetic energy on an average.
 (2) The probability density of finding the electron is maximum at the nucleus.
 (3) The total energy of the electron is maximum when it is at a distance a_0 from the nucleus.
 (4) The electron can be found at a distance $2a_0$ from the nucleus.

Ans. [3]

Sol. (1) T.E. = -K.E. = $\frac{\text{PE}}{2}$



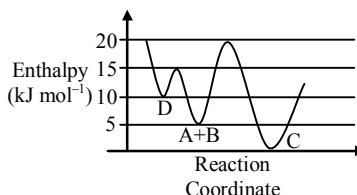
It does not have any boundary.

- Q.28** The layer of atmosphere between 10 km to 50 km above the sea level is called as :
 (1) troposphere (2) thermosphere (3) stratosphere (4) mesosphere

Ans. [3]

Sol. Memory based.

- Q.29** Consider the given plot of enthalpy of the following reaction between A and B. $\text{A} + \text{B} \rightarrow \text{C} + \text{D}$. Identify the incorrect statement.

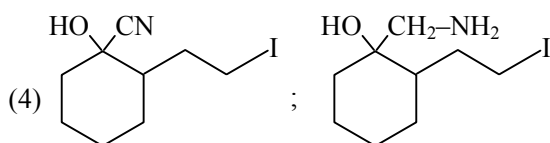
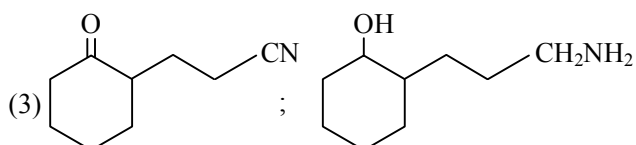
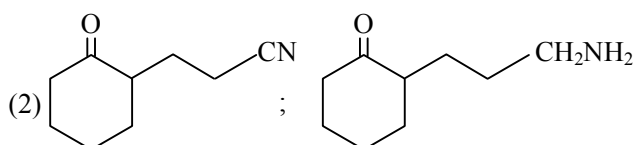
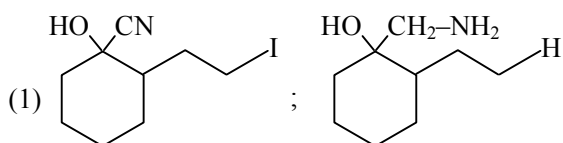
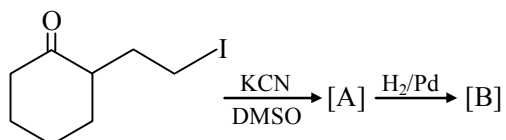


- (1) C is the thermodynamically stable product.
 (2) Formation of A and B from C has highest enthalpy of activation.
 (3) Activation enthalpy to form C is 5 kJ mol^{-1} less than that to form D.
 (4) D is kinetically stable product.

Ans. [3]

Sol. $E_a = (d \rightarrow c) = 15 - 0 = 15$
 $E_a = (A + B) \rightarrow C = 15$
 $E_a = (A + B \rightarrow D) = 10$
 $E_a = C \rightarrow (A + B) = 20$

Q.30 The major products A and B for the following reactions are, respectively :



Ans. [3]

Sol.

