JEE (ADVANCED) 2019 PAPER I

CHEMISTRY

SECTION-1 (Maximum Marks : 12)

* This section contains FOUR (04) questions.
* Each question has FOUR options ONLY ONE of these four options is the correct answer.
* For each question, choose the correct option corresponding to the correct answer.
* Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +3 If ONLY the correct option is chosen.

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered).

Negative Marks : –1 In all other cases

1. Calamine, malachite, magnetite and cryolite, respectively, are **Question ID : 337911128**

कैलामीन (Calamine), मैलाकाइट (malachite), मेग्नेटाइट (magnetite) और क्रायोलाइट (cryolite), क्रमशः है।

(1) $ZnSO_4$, $Cu(OH)_2$, Fe_3O_4, Na_3AlF_6

(2) $ZnSO_4$, $CuCO_3$, AlF_3

(3) $ZnCO_3$, $CuCO_3.Cu(OH)_2$, Fe_3O_4, Na_3AlF_6

(4) $ZnCO_3$, $CuCO_3$, Fe_2O_3, Na_3AlF_6

Ans. 3

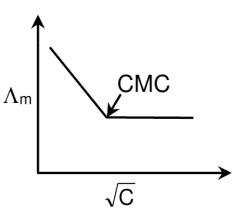
S.
* Malachite green Or Basic Copper Carbonate : $CuCO_3.Cu(OH)_2$
* Magnetite : Fe_3O_4 ($FeO + Fe_2O_3$)
* Calamine : $ZnCO_3$
* Cryolite : Na_3AlF_6

2. Molar conductivity $(\wedge_m)$ of aqueous solution of sodium stearate, which behaves as a strong electrolyte, is recorded at varying concentrations (3) of sodium stearate. Which one of the following plots provides the correct representation of micelle formation in the solution ?

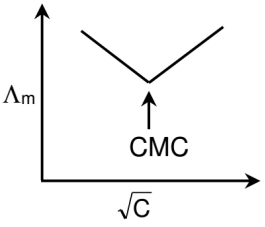
(Critical micelle conscentration (CMC) is marked with an arrow in the figures) **Question ID : 337911129**

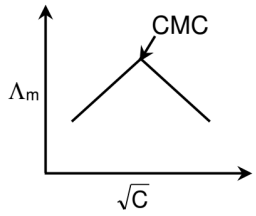
सोडियम स्टिऐरेट (sodium stearate) के जलीय विलयन, जो एक प्रबल वैद्युत अपघट्य (electrolyte) जैसा व्यवहार दर्शाता है, की मोलर चालकता $(\wedge_m)$ को विभिन्न सान्द्रताओं (3) में मापा गया। निम्न चित्रों में से मिसेल विरचन (micelle formation) दर्शाने वाला सही चित्र कौनसा है, (क्रांतिक मिसेल सान्द्रता (Critical micelle conscentration CMC)) को चित्रों में तीर द्वारा दर्शाया गया है)

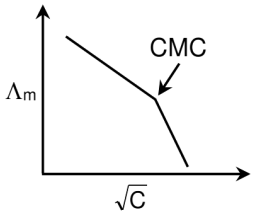
(1)



(2)



(3) 

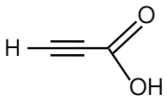
(4) 

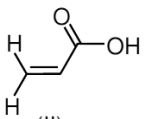
Ans. **4**

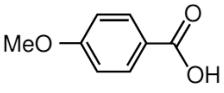
S. As the concentration of sodium stearate increases beyond CMC, stearate ions aggregate to form micelles. Due to which, the number of the current carrier anions decreases and this is reflected by the sharp change in $\wedge_m$ at CMC, followed by greater rate of decrease of $\wedge_m$ with $\sqrt{C}$.

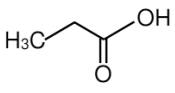
3. The correct order of acid strength of the following carboxylic acids is. **Question ID : 337911130**

निम्न कार्बोक्सिलिक अम्लों की अम्ल प्रबलता का सही क्रम है:


(I)


(II)


(III)


(IV)

(1) I > III > II > IV (2) II > I > IV > III (3) I > II > III > IV (4) III > II > I > IV

Ans. **3**

S.

	pKa
(i) $HC \equiv C–COOH$	1.89
(ii) $H_2C = CH–COOH$	4.3
(iii) MeO  COOH	4.5
(iv) $CH_3–CH_2–COOH$	4.87

So order of values of Ka $\Rightarrow$ I > II > III > IV

4. The green colour produced in the borax bead test of a chromium (III) salt is due to. **Question ID : 337911127**

क्रोमियम (III) लवण के सुहागा–मनका परीक्षण (borax bead test) में हरे रंग का कारण है।

(1) $Cr_2(B_4O7)_3$ (2) CrB (3) $Cr(BO_2)_3$ (4) Cr_2O_3

Ans. **3**

S. $Na_2B_4O_7.10H_2O \xrightarrow{\Delta} Na_2B_4O_7 \xrightarrow{\Delta} \underset{\text{Sodium Meta borate}}{NaBO_2} + \underset{\text{Boric anhydride}}{B_2O_3}$

<u>Oxidising flame</u>

$Cr_2O_3 + B_2O_3 \xrightarrow{\Delta} \underset{\text{Blue flame}}{Cr(BO_2)_2}$ (in Cold condition)

$Cr(BO_2)_2 + B_2O_3 \xrightarrow{\Delta} \underset{\text{Green flame}}{Cr(BO_2)_3}$ (in Hot condition)

SECTION-2 (MAXIMUM MARKS : 32)

* This section contains **Eight (08)** questions.
* Each question has **FOUR** options for correct answer(s). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct option(s).
* For each question, choose the correct option(s) to answer the question.
* Answer to each question will be evaluated according to the following marking scheme:

Full Marks	: +4	If only (all) the correct option(s) is (are) chosen.
Partial Marks	: +3	If all the four options are correct but ONLY three options are chosen.
Partial Marks	: +2	If three or more options are correct but ONLY two options are chosen, both of which are correct options.
Partial Marks	: +1	If two or more options are correct but ONLY one option is chosen and it is a correct option.
Zero Marks	: 0	If none of the options is chosen (i.e. the question is unanswered).
Negative Marks	: –1	In all other cases.

1. Each of the following options contains a set of four molecules, Identify the option(s) where all four molecules possess permanent dipole moment at room temperature. **Question ID : 337911135**

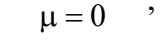
निम्न विकल्पों में चार अणुओं के समुच्चय हर विकल्प में दिए गए हैं। सामान्य ताप पर, जिस (जिन) विकल्प (विकल्पों) के सभी चार अणुओं की स्थायी द्विध्रुव–आघूर्ण (permanent dipole moment) है, उसे (उन्हें) चुनिये।

(1) $BeCl_2$, CO_2, BCl_3, $CHCl_3$ (2) SO_2, C_6H_5Cl, H_2Se, BrF_5

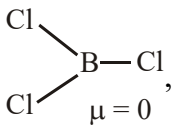
(3) NO_2, NH_3. $POCl_3$, CH_3Cl (4) BF_3, O_3, SF_6, XeF_6

Ans. **2,3**

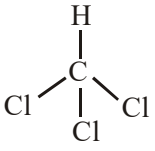
S. (1) Cl – Be – Cl, $\mu = 0$,



$\mu = 0$,

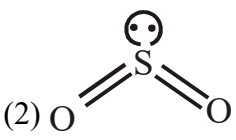


$\mu = 0$,



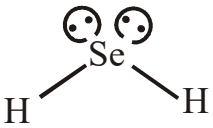
$\mu \neq 0$

(2)

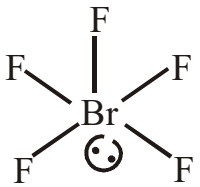


$\mu \neq 0$

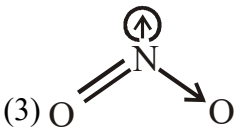
$\mu \neq 0$

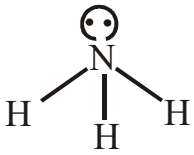


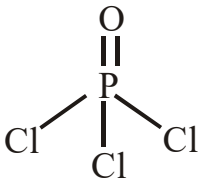
$\mu \neq 0$

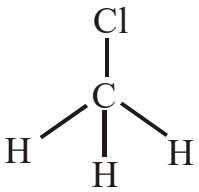


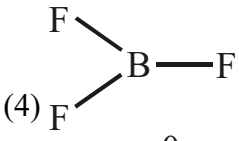
$\mu \neq 0$

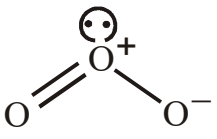
(3)  $\mu \neq 0$

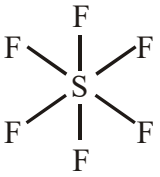
 $\mu \neq 0$

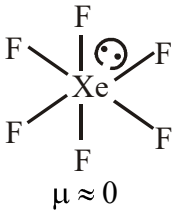
 $\mu \neq 0$

 $\mu \neq 0$

(4)  $\mu = 0$

 $\mu \neq 0$

 $\mu = 0$

 $\mu \approx 0$

[ℓ.p. is stereo chemically active]

2. Fusion of MnO_2 with KOH in presence of O_2 produces a salt W. Alkaline solution of W upon electrolytic oxidation yields another salt X. The manganese containing ions present in W and X, respectively, are Y and Z. Correct statement (s) is (are). **Question ID : 337911132**

(1) In aqueous acidic solution, Y undergoes disproportionation reaction to give Z and MnO_2.

(2) Y is diamagnetic in nature while Z is paramagnetic

(3) Both Y and Z are coloured and have tetrahedral shape

(4) In both Y and Z, π-bonding occurs between p-orbitals of oxygen and d-orbitals of manganese

O_2 की उपस्थिति में MnO_2 का KOH के साथ संगलन पर एक लवण W उत्पादित होता है W के क्षारीय विलयन का विद्युत अपघटनीय ऑक्सीकरण (electrolytic oxidation) पर एक अन्य लवण X उत्पादित होता है W और X में उपस्थित मैंगनीज रहने वाला आयन क्रमशः Y और Z है। सही कथन है (हैं)

(1) जलीय अम्लीय घोल में Y असमानुपातन अभिक्रिया (disproportionation reaction) के पश्चात Z और MnO_2 देता है।

(2) Y प्रतिचुम्बकीय (diamagnetic) स्वभाव और Z अनुचुम्बकीय (paramagnetic) स्वभाव के है।

(3) Y और Z दोनों रंगीन और चतुष्फलकीय (tetrahedral) आकार के है।

(4) Y और Z दोनों में, π-आबन्ध ऑक्सीजन के p-कक्षकों एवं मैंगनीज के d-कक्षकों के बीच है।

Ans. 1,3,4

S. $MnO_2 \xrightarrow[\text{fused}]{KOH/O_2} \underset{\text{Green(W)}}{K_2MnO_4} \xrightarrow[\text{oxidation}]{\text{Electrolytic}} \underset{\text{Purple(X)}}{KMnO_4}$

$Y \rightarrow MnO_4^{2-}$ (Green)

$Z \rightarrow MnO_4^{-}$ (Purple)

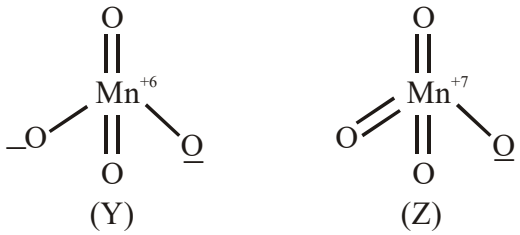
$\underset{(Y)}{MnO_4^{2-}} \xrightarrow[\text{Dis prop}^{n} \text{ reaction}]{\text{Acidic Medium}} MnO_4^{-} + MnO_2$

* MnO_4^{2-} (Y) is Green coloured and MnO_4^{-} (Z) is purple coloured compound.

* MnO_4^{2-} (Y) is paramagnetic and MnO_4^- (Z) is diamagnetic compound.

* MnO_4^{2-} (Y) and MnO_4^- (Z) both are tetrahedral.

Compound



(Y)

(Z)

* Both Y and Z having pp–dp bonds.

3. A tin chloride Q undergoes the following reactions (not balanced)

$Q + Cl^- \rightarrow X$

$Q + Me_3N \rightarrow Y$

$Q + CuCl_2 \rightarrow Z + Cucl$

X is a monoanion having pyramidal geometry. Both Y and Z are neutral compounds. Choose the correct options(s). **Question ID : 337911131**

(1) The central atom in Z has one lone pair of electrons

(2) There is a coordinate bond in Y

(3) The central atom in X in sp^3 hybridized

(4) The oxidation state of the central atom in Z is +2

एक टिन क्लोराइड Q, निम्न अभिक्रियाएँ (असन्तुलित) दर्शाता है।

$Q + Cl^- \rightarrow X$

$Q + Me_3N \rightarrow Y$

$Q + CuCl_2 \rightarrow Z + Cucl$

X एक पिरामिडिय ज्यामिति (pyramidal geometry) दर्शानेवाला एकल ऋणायन (monoanion) है। Y और Z दोनों उदासीन यौगिक है। सही विकल्प (विकल्पों) को चुनिये –

(1) Z में केन्द्रीय परमाणु पर एक एकाकी इलेक्ट्रॉन युग्म (lone pair of electrons) है

(2) Y में समन्वयी आबंध (coordinate bond) है

(3) X में केन्द्रीय परमाणु का संकरण (hybridization) sp^3 है

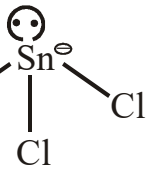
(4) Z में केन्द्रीय परमाणु की ऑक्सीकरण अवस्था (oxidation state) +2 है

Ans. 2, 3

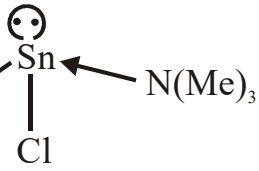
S. $\underset{(Q)}{SnCl_2} + Cl^- \longrightarrow \underset{(X)}{SnCl_3^-}$

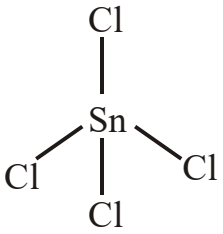
$\underset{(Q)}{SnCl_2} + Me_3N \longrightarrow SnCl_2\underset{(Y)}{\left[N(CH_3)_3\right]}$

$\underset{(Q)}{SnCl_2} + 2CuCl_2 \longrightarrow \underset{(Z)}{SnCl_4} + 2CuCl$

X ⇒ 

[Sn = Sp^3 hybridized oxidation state of Sn = + 2]

Y ⇒ 

Z ⇒ 

4. Which of the following statement(s) is (are) true ? **Question ID : 337911137**

(1) Hydrolysis of sucrose gives dextrorotatory glucose and laevorotatory fructose

(2) Oxidation of glucose with bromine water gives glutamic acid

(3) Monosaccharides cannot be hydrolysed to give polyhydroxy aldehydes and ketones

(4) The two six-membered cyclic hemiacetal forms of D-(+)-glucose are called anomers

निम्न में सही कथन कौन सा है (से हैं) ?

(1) सुक्रोस (sucrose) के जलअपघटन पर दक्षिण ध्रूवण–घूर्णक (dextrorotatory) ग्लूकोस और वाम ध्रूवण–घूर्णक (laevorotatory) फ्रक्टोज (fructose) प्राप्त होते हैं

(2) ब्रोमीन (bromine) जल द्वारा ग्लूकोस (glucose) के ऑक्सीकरण पर ग्लूटामिक (glutamic) अम्ल प्राप्त होता है

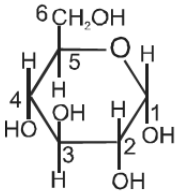
(3) मोनोसेकैराइडों (monosaccharides) के जलअपघटन कराने पर पालीहाइड्रोक्सी ऐल्डीहाइड (polyhydroxy aldehydes) और कीटोन (ketone) प्राप्त नहीं होते हैं

(4) D-(+)-ग्लूकोस के दो छः सदस्यीय चक्रीय हैमिऐसीटैल (hemiacetal) रूपों को ऐनोमर (anomer) कहते है

Ans. 1, 3, 4

S. (1) $\text{Sucrose} \xrightarrow[\text{Hydrolysis}]{\overset{+}{H}H_2O} \underset{[\text{Dextrorotatory}]}{D(+)\text{Glucose}} + \underset{[\text{Laevorotatory}]}{D(+)\text{Fructose}}$

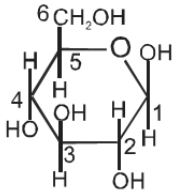
(2) Oxidation of glucose with bromine water gives gluconic acid.

(4) 

$\alpha^\circ = (112^\circ)$

α-D-glucopyranose

&



$\alpha^\circ = (19^\circ)$

β-D-glucopyranose

are anomers of each other.

5. Which of the following statement(s) is (are) correct regarding the root mean square speed (μ_{rms}) and average translational kinetic energy (ε_{av}) of a molecule in a gas at equilibrium ? **Question ID : 337911134**

(1) U_{rms} is inversely proportional to the square root of its molecular mass

(2) U_{rms} is doubled when its temperature is increased four times

(3) ε_{av} is doubled when its temperature is increased four times

(4) ε_{av} at a given temperature does not depend on its molecular mass

साम्यावस्था में, एक गैस अणु की वर्ग माल्य मूल गति (root mean square speed, μ_{rms}) और औसत स्थानान्तरण ऊर्जा (average translational kinetic energy, ε_{av}) के संदर्भ में, निम्न कथनों में से सही कथन कौन सा(से) है(हैं) ?

(1) आण्विक द्रव्यमान के वर्गमूल पर U_{rms} व्युत्क्रमानुपातीय (inversely proportional) है

(2) जब ताप चौगुना किया जाता है, तब U_{rms} दुगुनी हो जाती है

(3) जब ताप चौगुना किया जाता है, तब ε_{av} दुगुनी हो जाती है

(4) किसी दिये गए ताप पर, ε_{av} आण्विक द्रव्यमान पर निर्भर नहीं है

Ans. **1, 2, 4**

S. $U_{rms} = \sqrt{\frac{3RT}{M}}$

Hence option 1 and 2 are correct

Averege translational kinetic

energy $(\varepsilon_{av}) = \frac{3}{2}KT$

Hence if temperature is increased
four times K.E. will double and is
independent of molecular mass of gas

Correct option = 1, 2, 4

6. Choose the reactions(s) from the following options, for which the standard enthalpy of reaction is equal to the standard enthalpy of formation. **Question ID : 337911133**

निम्न विकल्पों में से वो अभिक्रिया (अभिक्रियाएं) जिसकी (जिनकी) मानक अभिक्रिया एन्थैल्पी (standard enthalpy of reaction) अपने मानक विरचन एन्थैल्पी (standard enthalpy of formation) के समान हो, उसे (उन्हें) चुनिये।

(1) $\frac{1}{8}S_8(s) + O_2(g) \rightarrow SO_2(g)$

(2) $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

(3) $\frac{3}{2}O_2(g) \rightarrow O_3(g)$

(4) $2C(g) + 3H_2(g) \rightarrow C_2H_6(g)$

Ans. **1, 3**

S. $\frac{1}{8}S_8(s) + O_2(g) \rightarrow SO_2(g)\ \Delta H = \Delta H_f(SO_2, g)$

$2H_2(g) + O_2(g) \rightarrow 2H_2O(l)\Delta H = 2\Delta H_f(H_2O, l)$

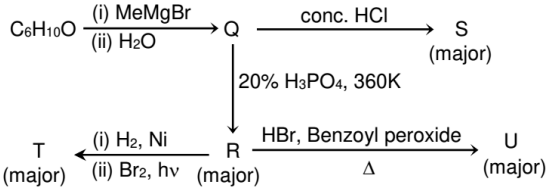
$\frac{3}{2}O_2(g) \rightarrow O_3(g)\ \ \Delta H = \Delta H_f(O_3, g)$

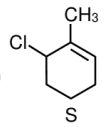
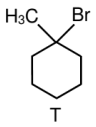
$2C(g) + 3H_2(g) \rightarrow C_2H_6(g)$

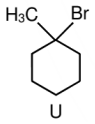
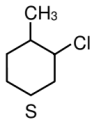
It does not represent $\Delta H_f(C_2H_6, g)$

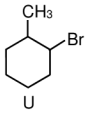
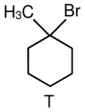
7. Choose the correct option(s) for the following set of reactions **Question ID : 337911138**

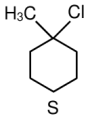
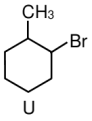
दिये गए अभिक्रिया क्रमों के लिए सही विकल्प (विकल्पो) को चुनिये



(1)  

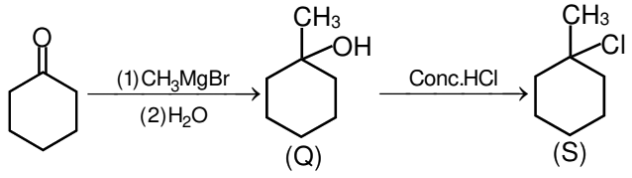
(2)  

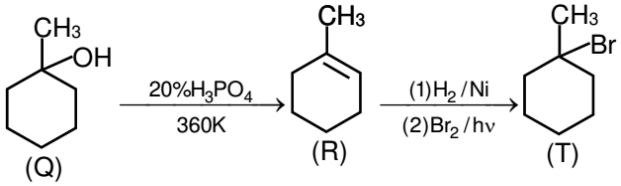
(3)  

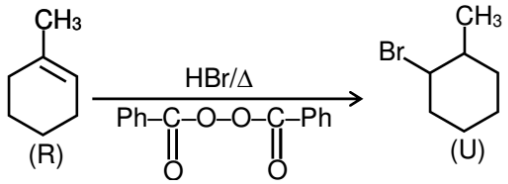
(4)  

Ans. **3, 4**

S.







8. In the decay sequence,

$$^{238}_{92}U \xrightarrow{-X_1} {}^{234}_{90}Th \xrightarrow{-X_2} {}^{234}_{91}Pa \xrightarrow{-X_3} {}^{234}Z \xrightarrow{-X_4} {}^{230}_{90}Th$$

x_1, x_2, x_3 and x_4 are particles/radiation emitted by the respective isotopes. The correct option(s).

Question ID : 337911136

(1) x_1 will deflect towards negatively charged plate

(2) x_3 is γ-ray

(3) Z is an isotope of uranium

(4) x_2 is β^-

दिये गए क्षय क्रम में ,

$$^{238}_{92}U \xrightarrow{-X_1} {}^{234}_{90}Th \xrightarrow{-X_2} {}^{234}_{91}Pa \xrightarrow{-X_3} {}^{234}Z \xrightarrow{-X_4} {}^{230}_{90}Th$$

x_1, x_2, x_3 और x_4 क्रमानुसार प्रत्येक समस्थानिक (isotope) से उत्सर्जित कण/विकरण है। सही विकल्प है (हैं)

(1) x_1 ऋणावेशित प्लेट (negatively charged plate) की तरफ विक्षेपित होगा

(2) x_3 है γ-किरण

(3) Z यूरेनियम (uranium) का एक समस्थानिक है

(4) x_2 is β^-

Ans. 1, 3, 4

S. $^{238}_{92}U \rightarrow {}_{90}Th^{234} + X_1$ $\quad X_1 = {}_2He^4$ (α particle)

Hence it will deffect towards negatively charged plate.

${}_{90}Th^{234} \rightarrow {}_{91}Pa^{234} + X_2$ $\quad X_2 = {}_{-1}e^0$ (β particle)

${}_{91}Pa^{234} \rightarrow Z^{234} + X_3$ $\quad X_3 = {}_{-1}e^0$

$Z^{234} \rightarrow {}_{90}Th^{230} + X_4$ $\quad X_4 = {}_2He^4$

Hence Z is isotope of U^{238}

Correct option = 1, 3, 4

SECTION 3

SECTION-3 : (Maximum Marks: 18)

* This section contains **SIX (06)** questions. The answer to each question is a **NUMERICAL VALUE.**
* For each question, enter the correct numerical value of the answer using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer. If the numerical value has more than two decimal places, truncate/round-off the value to TWO decimal places.
* Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +3 If ONLY the correct numerical value is entered.

Zero Marks : 0 In all other cases.

1. For the following reaction, the equilibrium constant K_c at 298 K is 1.6×10^{17}

$Fe^{2+}(aq) + s^{2-}(aq) \rightleftharpoons FeS(s)$

When equal volumes of 0.06 M Fe^{2+} (aq) and 0.2 M S^{2-} (aq) solutions are mixed, the equilibrium concentration of Fe^{2+} (aq) is found to be $Y \times 10^{-17}$ M. The vlaue of Y is_____ **Question ID : 337911141**

298 K पर, निम्न अभिक्रिया का साम्यावस्ता स्थिरांक K_c (equilibrium constant) 1.6×10^{17} है।

$Fe^{2+}(aq) + s^{2-}(aq) \rightleftharpoons FeS(s)$

जब 0.06 M Fe^{2+} (aq) और 0.2 M S^{2-} (aq) के समान आयतनों का मिश्रण किया गया, तब Fe^{2+} (aq) की साम्य सान्द्रता (equilibrium concentration) $Y \times 10^{-17}$ M पायी गयी। Y का मान है _____

Ans. 8.93

S. $Fe^{2+}(aq) + s^{2-}(aq) \rightleftharpoons FeS(s)$ $\quad K_C = 1.6 \times 10^{17}$

$t = 0$	0.06V	0.2V
$t = t_{eq}$	(0.06V – X)	(0.2V – X)

Since k_{eq} is very large so $(0.06V - X) \rightarrow 0$

So $X \rightarrow 0.06$ V

Moles of $s^{2-} = (0.2V - 0.06V)$

$$1.6 \times 10^{17} = \frac{1}{[Fe^{2+}]\left[\frac{0.2V - 0.06V}{2V}\right]}$$

$$1.6 \times 10^{17} = \frac{1}{[Fe^{2+}](0.07)}$$

$$[Fe^{2+}] = \frac{1}{7 \times 10^{-2} \times 1.6 \times 10^{17}}$$

$[Fe^{2+}] = 8.928 \times 10^{-17}$

$[Fe^{2+}] = 8.93 \times 10^{-17}$ (round off)

8.93

2. Consider the kinetic data given in the following table for the reaction A + B + C → Product.

Experiment No.	[A] (mol dm^{-3})	[B] (mol dm^{-3})	[C] (mol dm^{-3})	Rate of reaction (mol dm^{-3} s^{-1})
1	0.2	0.1	0.1	6.0×10^{-5}
2	0.2	0.2	0.1	6.0×10^{-5}
3	0.2	0.1	0.2	1.2×10^{-4}
4	0.3	0.1	0.1	9.0×10^{-5}

The rate of the reaction for [A] = 0.15 mol dm^{-3}, [B] = 0.25 mol dm^{-3} and [C] = 0.15 mol dm^{-3} is found to be $Y \times 10^{-5}$ mol $dm^{-3}s^{-1}$. The value of Y is_____ **Question ID : 337911143**

निम्न सारणी में, A + B + C → उत्पाद की अभिक्रिया के बलगतिकी आंकड़ों पर गौर कीजिये।

Experiment No.	[A] (mol dm^{-3})	[B] (mol dm^{-3})	[C] (mol dm^{-3})	Rate of reaction (mol dm^{-3} s^{-1})
1	0.2	0.1	0.1	6.0×10^{-5}
2	0.2	0.2	0.1	6.0×10^{-5}
3	0.2	0.1	0.2	1.2×10^{-4}
4	0.3	0.1	0.1	9.0×10^{-5}

जब [A] = 0.15 mol dm^{-3}, [B] = 0.25 mol dm^{-3} और [C] = 0.15 mol dm^{-3} है,

तब अभिक्रिया गति $Y \times 10^{-5}$ mol $dm^{-3}s^{-1}$ पायी गयी। Y का मान है_____

Ans. **Y = 6.75**

S. $r = K[A]^{\alpha}[B]^{\beta}[C]^{\gamma}$

$6 \times 10^{-5} = K[0.2]^{\alpha}[0.1]^{\beta}[0.1]^{\gamma}$ ..... (I)

$6 \times 10^{-5} = K[0.2]^{\alpha}[0.2]^{\beta}[0.1]^{\gamma}$ .....(II)

(I) ÷ (II)

$$1 = \left(\frac{1}{2}\right)^{\beta} \Rightarrow \beta = 0$$

$1.2 \times 10^{-4} = K[0.2]^{\alpha}[0.1]^{\beta}[0.2]^{\gamma}$ .....(III)

(I) ÷ (III)

$$\frac{6\times10^{-5}}{1.2\times10^{-4}} = \left(\frac{1}{2}\right)^{\gamma} \Rightarrow \frac{1}{2} = \left(\frac{1}{2}\right)^{\gamma} \Rightarrow \gamma = 1$$

$9\times10^{-5} = K[0.3]^{\alpha}[0.1]^{\beta}[0.1]^{\gamma}$ .....(IV)

(I) ÷ (IV)

$$\frac{6\times10^{-5}}{9\times10^{-5}} = \left(\frac{2}{3}\right)^{\alpha} \Rightarrow \frac{2}{3} = \left(\frac{2}{3}\right)^{\alpha} \Rightarrow \alpha = 1$$

from .....(1)

$6\times10^{-5} = K[0.2]^{1}[0.1]^{0}[0.1]^{1}$

$K = 3\times10^{-3}$

$Y\times10^{-5} = 3\times10^{-3}[0.15]^{1}[0.25]^{0}[0.15]^{1}$

$$Y = \frac{3\times10^{-3}\times15\times10^{-2}\times15\times10^{-2}}{10^{-5}}$$

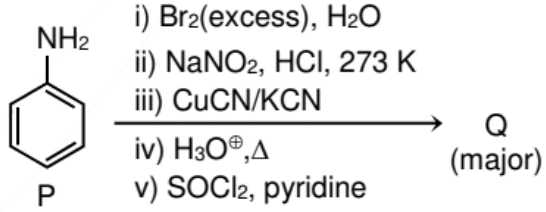
$Y = 225 \times 3 \times 10^{-2}$

$Y = 6.75$

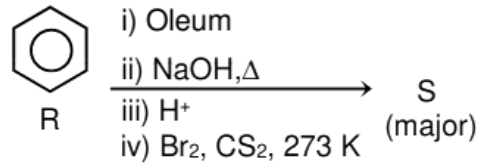
3. Schemes 1 and 2 describe the conversion of P to Q and R to S, respectively, Scheme 3 describes the synthesis of T from Q and S. The total number of Br atoms in a molecule of T is _____ **Question ID : 337911144**

योजनायें 1 और 2 (schemes 1 and 2) क्रमशः P से Q तक तथा R से S तक का रूपान्तरण दर्शाते है। योजना 3 में T का संश्लेषण Q और S से दर्शाया गया है। T के एक अणु में Br परमाणुओं की कुल संख्या है _____

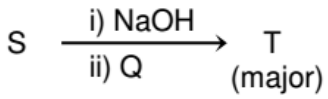
Scheme 1:



Scheme 2:



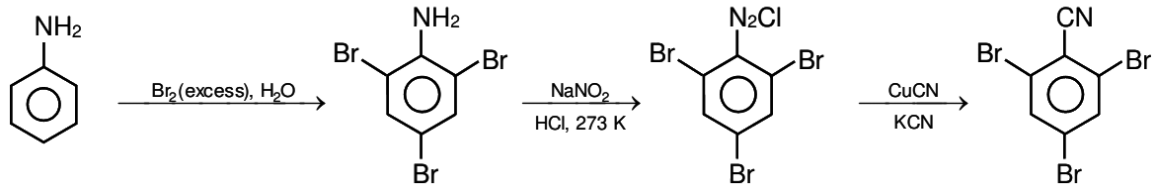
Scheme 3:

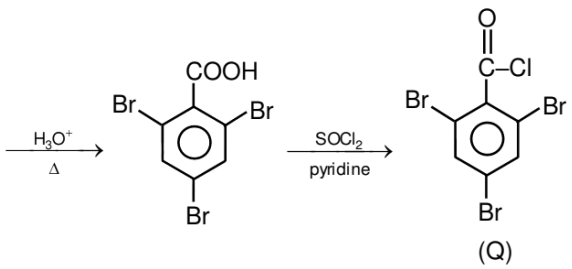


Ans. 4

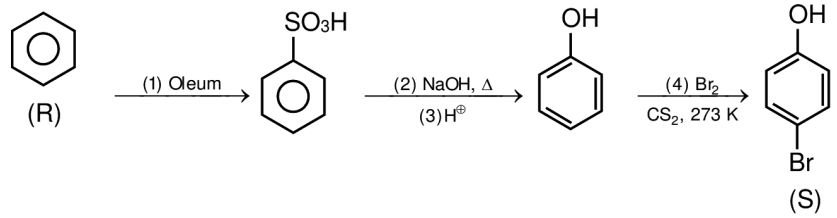
S.

Scheme 1:

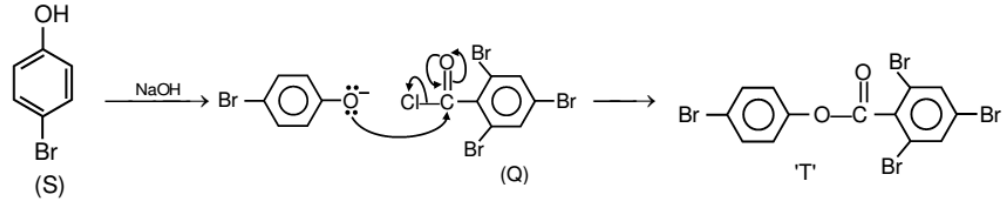




Scheme 2:



Scheme 3:

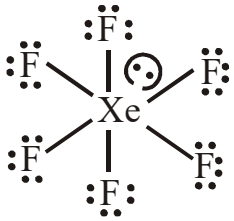


4. At 143 K, the reaction of XeF_4 with O_2F_2 produces a xenon compound Y. The total number of lone pair (s) of electrons present on the whole molecule of Y is_____ **Question ID : 337911140**

143 K पर, XeF_4 और O_2F_2 की अभिक्रिया से एक जीनॉन (xenon) यौगिक Y उत्पादित होता है। सम्पूर्ण अणु Y में एकाकी इलेक्ट्रॉन युग्म (युग्मों) (lone pair (s) of electrons) की कुल संख्या है_____

Ans. 19

S. $XeF_4 + O_2F_2 \longrightarrow \underset{(Y)}{XeF_6} + O_2$



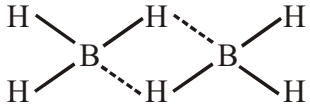
Total *l*.p. at $XeF_6 = 19$

5. Among B_2H_6, $B_3N_3H_6$, N_2O, N_2O_4, $H_2S_2O_3$ and $H_2S_2O_8$, the total number of molecules containing covalent bond between two atoms of the same kind is_____ **Question ID : 337911139**

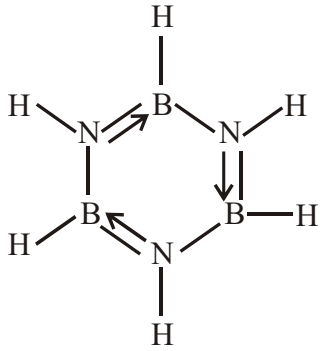
B_2H_6, $B_3N_3H_6$, N_2O, N_2O_4, $H_2S_2O_3$ और $H_2S_2O_8$ में से जिन अणुओं में दो समान परमाणुओं के बीच सहसंयोजक (covalent) आबन्ध है, उनकी कुल संख्या है_____

Ans. 4

S. (1)

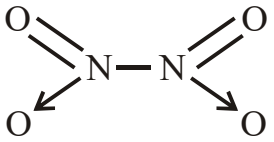


(2)

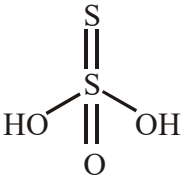


(3) $N \equiv \overset{+}{N} - \overset{-}{O}$

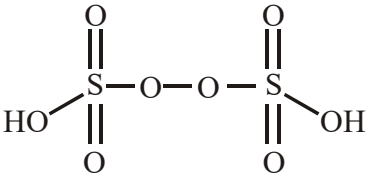
(4)



(5)



(6)



6. On dissolving 0.5 g of a non-volatile non-ionic solute to 39 g of benzene, its vapor pressure decreases from 650 mm Hg to 640 mm Hg. The depression of freezing point of benzene (in K) upon addition of the solute is_____ **Question ID : 337911142**

(Given data : Molar mass and the molal freezing point depression constant of benzene are 78 g mol^{-1} and 5.12 K kg mol^{-1}, respectively)

0.5 g अवाष्पशील अनायनिक विलेय (non-volatile non-ionic solute) को 39 g बेन्जीन (benzene) में घोलने पर, उसका वाष्प दाब 650 mm Hg से 640 mm Hg हो गया। इस विलेय को बेन्जीन में मिलाने के उपरान्त, बेन्जीन के हिमांक का अवनमन (depression of freezing point) (K में) है_____

(दिया गया : बेन्जीन का मोलर द्रव्यमान 78 g mol^{-1} और बेन्जीन का मोलल अवनमन स्थिरांक (molal freezing point depression constant) 5.12 K kg mol^{-1} है।)

Ans. **1.02**

S. $\frac{P^0 - P_s}{P^0} = \frac{n}{n+N}$

$$\frac{650-640}{650} = \frac{n}{n+\frac{1}{2}}$$

$$\frac{1}{65} = \frac{n}{n+\frac{1}{2}}$$

$$n + \frac{1}{2} = 65n \Rightarrow n = \frac{1}{128}$$

$$\Delta T_f = 5.12 \times \frac{1}{\frac{128}{39}} \times 1000$$

$$= 1.02$$