



JEE (Adv.) 2019

PAPER-I

Time: 3 Hours.

INSTRUCTIONS

1. The test is of 3 hours duration.
2. The Test Booklet consists of 90 questions. The maximum marks are 360.
3. There are three parts in the question paper A, B, C consisting of **Physics, Chemistry and Mathematics** having 30 questions in each part of equal weightage. Each question is allotted 4 (four) marks for correct response.
4. Candidates will be awarded marks as stated above in instruction No. 3 for correct response of each question. $\frac{1}{4}$ (one-fourth) marks of the total marks allotted to the question will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
5. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction 4 above.
6. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.
7. Do not fold or make any stray mark on the Answer Sheet

USEFUL DATA

Atomic weights: Al = 27, Mg = 24, Cu = 63.5, Mn = 55, Cl = 35.5, O = 16, H = 1, P = 31, Ag = 108, N = 14, Li = 7, I = 127, Cr = 52, K = 39, S = 32, Na = 23, C = 12, Br = 80, Fe = 56, Ca = 40, Zn = 65.5, Ti = 48, Ba = 137, U = 238, Co = 59, B = 11, F = 19, He = 4, Ne = 20, Ar = 40, Mo = 96, Ni = 58.5, Sr = 87.5, Hg = 200.5, Tl = 204, Pb = 207 [Take : $\ln 2 = 0.69$, $\ln 3 = 1.09$, $e = 1.6 \times 10^{-19}$, $m_e = 9.1 \times 10^{-31}$ kg]
Take $g = 10 \text{ m/s}^2$ unless otherwise stated



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

Metallurgy

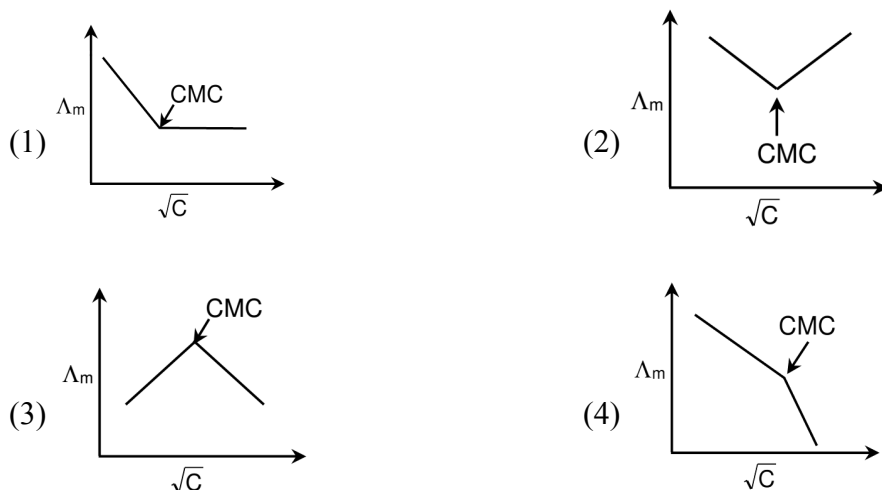
1. Calamine, malachite, magnetite and cryolite, respectively, are **Question ID : 337911128**
कैलामीन (Calamine), मैलाकाइट (malachite), मेग्नेटाइट (magnetite) और क्रायोलाइट (cryolite), क्रमशः है।
(1) ZnSO_4 , $\text{Cu}(\text{OH})_2$, Fe_3O_4 , Na_3AlF_6
(2) ZnSO_4 , CuCO_3 , AlF_3
(3) ZnCO_3 , CuCO_3 , $\text{Cu}(\text{OH})_2$, 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 : $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$
* Magnetite : Fe_3O_4 ($\text{FeO} + \text{Fe}_2\text{O}_3$)
* Calamine : ZnCO_3
* Cryolite : Na_3AlF_6

Surface chemistry

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 concentration (CMC) is marked with an arrow in the figures) **Question ID : 337911129**
सोडियम स्टीरेट (sodium stearate) के जलीय विलयन, जो एक प्रबल वैद्युत अपघट्य (electrolyte) जैसा व्यवहार दर्शाता है, की मोलर चालकता ($\wedge_m$) को विभिन्न सांद्रताओं (3) में मापा गया। निम्न चित्रों में से मिसेल विरचन (micelle formation) दर्शाने वाला सही चित्र कौनसा है, (क्रांतिक मिसेल सांद्रता (Critical micelle concentration CMC)) को चित्रों में तीर द्वारा दर्शाया गया है)



Ans. 4

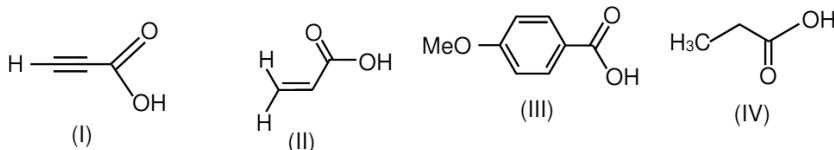
- S. As the concentration of sodium stearate increases beyond CMC, stearate ions aggregate to form micelles. Due to which, the number of the current carrier anions decreases and this is reflected by the sharp change in Λ_m at CMC, followed by greater rate of decrease of Λ_m with $\sqrt{C}$.

GOC

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:



- (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) $\text{HC} \equiv \text{C}-\text{COOH}$	1.89
(ii) $\text{H}_2\text{C} = \text{CH}-\text{COOH}$	4.3
(iii) $\text{MeO}-\text{C}_6\text{H}_4-\text{COOH}$	4.5
(iv) $\text{CH}_3-\text{CH}_2-\text{COOH}$	4.87

So order of values of $K_a \Rightarrow \text{I} > \text{II} > \text{III} > \text{IV}$

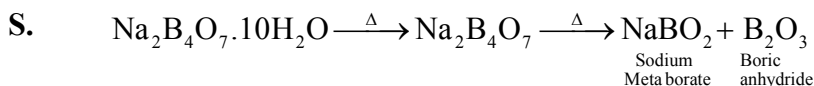
Qualitative analysis

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

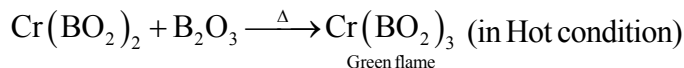
क्रोमियम (III) लवण के सुहागा-मनका परीक्षण (borax bead test) में हरे रंग का कारण है।

- (1) $\text{Cr}_2(\text{B}_4\text{O}_7)_3$ (2) CrB (3) $\text{Cr}(\text{BO}_2)_3$ (4) Cr_2O_3

Ans. 3



Oxidising flame



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:

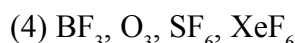
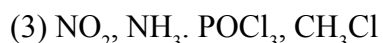
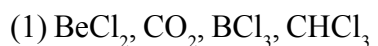
Full Marks	: +4	If only (all) the correct option(s) is (are) chosen.
Partial Marks	: +3	If all the four options are correct but ONLY three options are chosen.
Partial Marks	: +2	If three or more options are correct but ONLY two options are chosen, both of which are correct options.
Partial Marks	: +1	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.

Chemical bonding -I

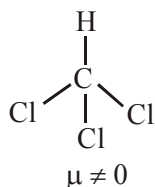
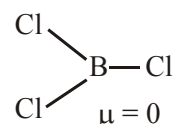
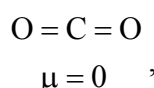
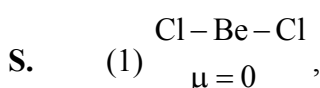
1. Each of the following options contains a set of four molecules, Identify the option(s) where all four molecules possess permanent dipole moment at room temperature.

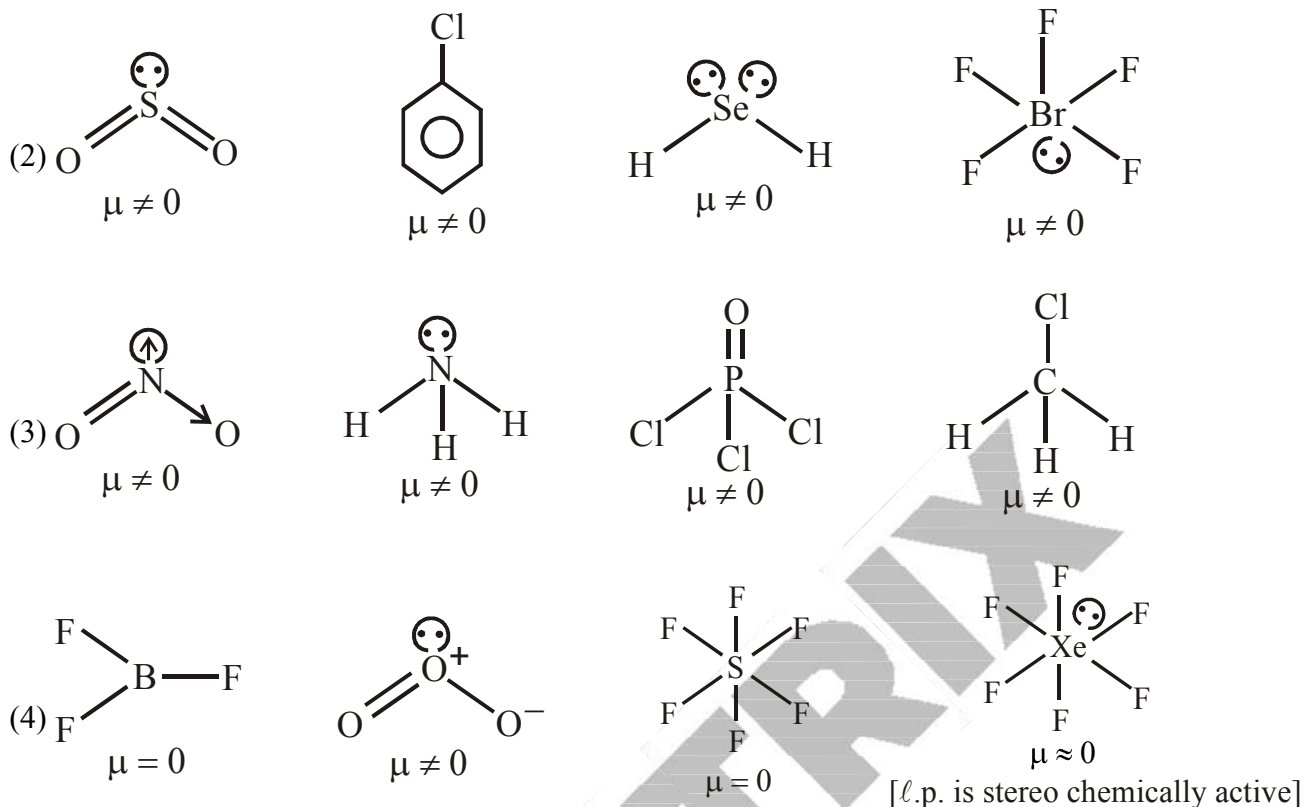
Question ID : 337911135

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।



Ans. 2,3





d-block

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।

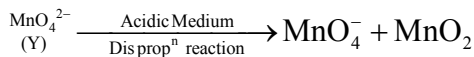
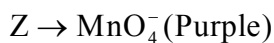
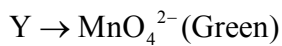
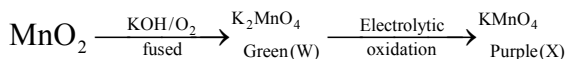
(2) Y प्रतिचुम्बकीय (diamagnetic) स्वभाव और Z अनुचुम्बकीय (paramagnetic) स्वभाव के है।

(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

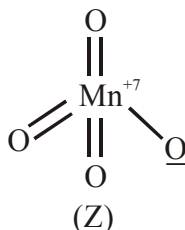
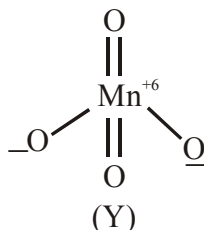
S.



* MnO_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.

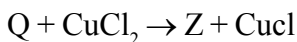
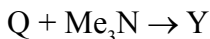
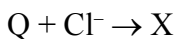
* MnO_4^{2-} (Y) and MnO_4^- (Z) both are tetrahedral.



* Both Y and Z having p π –d π bonds.

Type of reactions

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



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

Question ID : 337911131

Question ID : 337911131

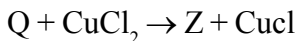
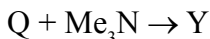
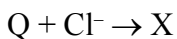
(1) The central atom in Z has one lone pair of electrons

(2) There is a coordinate bond in Y

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

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

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



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

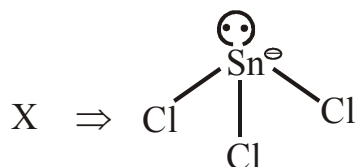
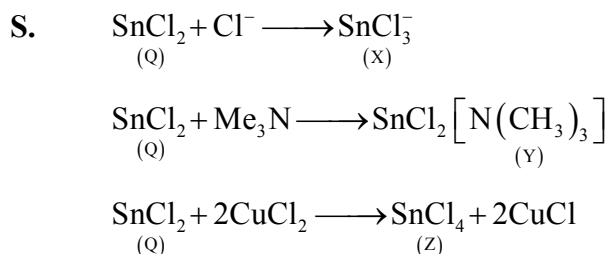
(1) Z में केन्द्रीय परमाणु पर एक एकाकी इलेक्ट्रॉन युग्म (lone pair of electrons) है

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

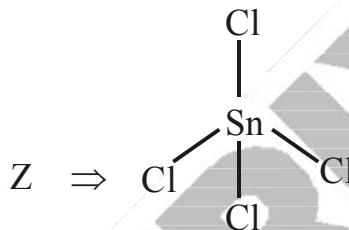
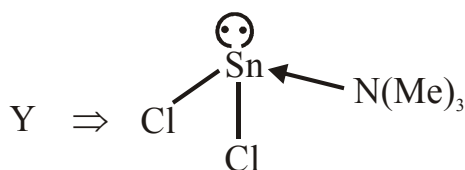
(3) X में केन्द्रीय परमाणु का संकरण (hybridization) sp^3 है

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

Ans. 2, 3



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



Biomolecules

4. Which of the following statement(s) is (are) true ?

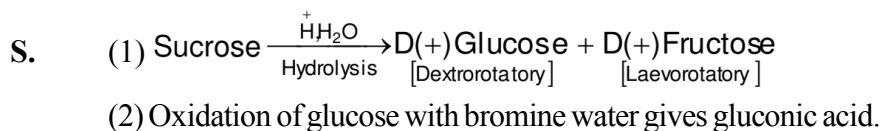
Question ID : 337911137

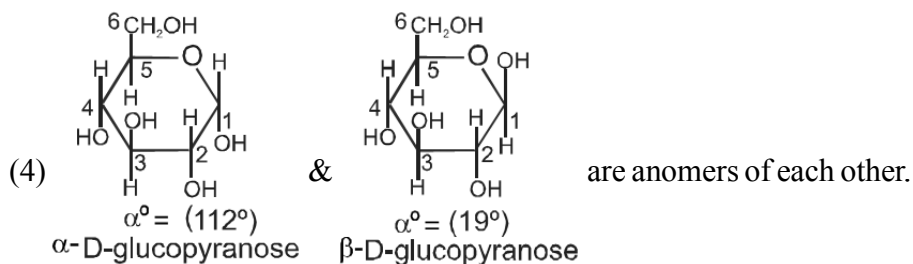
- (1) Hydrolysis of sucrose gives dextrorotatory glucose and laevorotatory fructose
- (2) Oxidation of glucose with bromine water gives glutamic acid
- (3) Monosaccharides cannot be hydrolysed to give polyhydroxy aldehydes and ketones
- (4) The two six-membered cyclic hemiacetal forms of D-(+)-glucose are called anomers

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

- (1) सुक्रोस (sucrose) के जलअपघटन पर दक्षिण ध्रुवण-घूर्णक (dextrorotatory) ग्लूकोस और वाम ध्रुवण-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 हैं

Ans. 1, 3, 4





Gaseous state

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

Hence option 1 and 2 are correct
 Average translational kinetic

energy (ϵ_{av}) = $\frac{3}{2}KT$

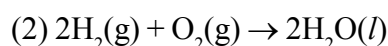
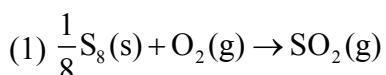
Hence if temperature is increased four times K.E. will double and is independent of molecular mass of gas

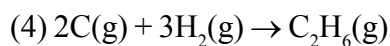
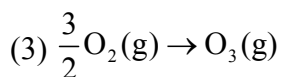
Correct option = 1, 2, 4

Thermochemistry

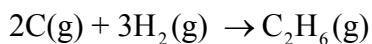
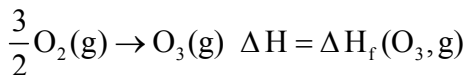
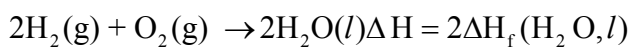
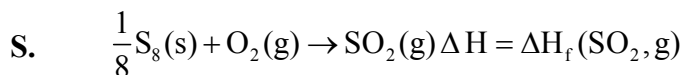
6. Choose the reactions(s) from the following options, for which the standard enthalpy of reaction is equal to the standard enthalpy of formation. **Question ID : 337911133**

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।





Ans. 1, 3



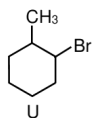
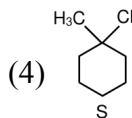
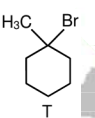
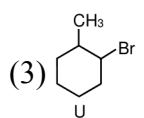
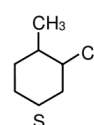
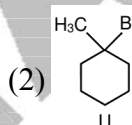
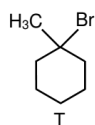
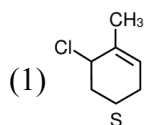
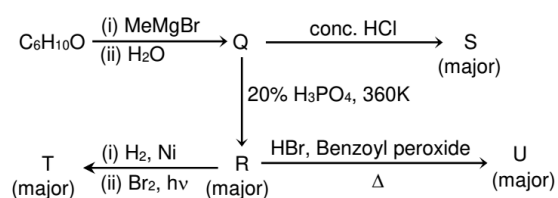
It does not represent $\Delta H_f(\text{C}_2\text{H}_6, \text{g})$

Carbonyl (aldehyde, ketone)

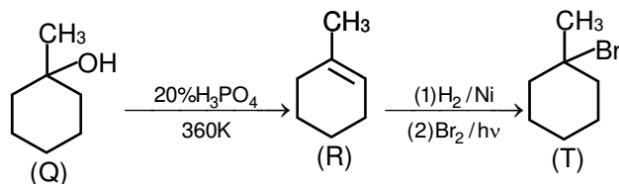
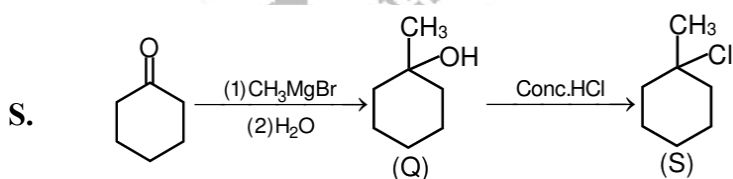
7. Choose the correct option(s) for the following set of reactions

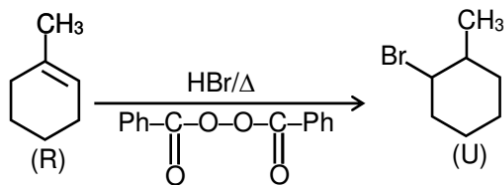
Question ID : 337911138

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



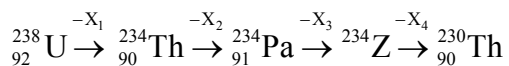
Ans. 3, 4





Radioactivity

8. In the decay sequence,



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

Question ID : 337911136

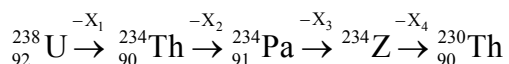
(1) x_1 will deflect towards negatively charged plate

(2) x_3 is γ -ray

(3) Z is an isotope of uranium

(4) x_2 is β^-

दिये गए क्षय क्रम में ,



x_1, x_2, x_3 और x_4 क्रमानुसार प्रत्येक समस्थानिक (isotope) से उत्सर्जित कण/विकिरण 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



Hence it will deflect towards negatively charged plate.



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.

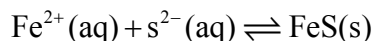
* Answer to each question will be evaluated according to the following marking scheme:

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

Zero Marks : 0 In all other cases.

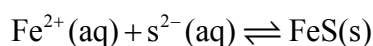
Chemical equilibrium

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



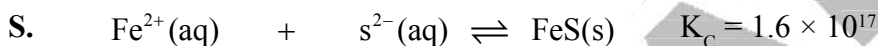
When equal volumes of 0.06 M $\text{Fe}^{2+}(\text{aq})$ and 0.2 M $\text{S}^{2-}(\text{aq})$ solutions are mixed, the equilibrium concentration of $\text{Fe}^{2+}(\text{aq})$ is found to be $Y \times 10^{-17}$ M. The value of Y is _____ **Question ID : 337911141**

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



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

Ans. 8.93



$t = 0$ 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 $X \rightarrow 0.06V$

Moles of $\text{S}^{2-} = (0.2V - 0.06V)$

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

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

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

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

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

8.93

Chemical kinetics

2. Consider the kinetic data given in the following table for the reaction $A + B + C \rightarrow \text{Product}$.

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 × 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 × 10⁻⁵ mol dm⁻³ s⁻¹ पायी गयी। Y का मान है _____

Ans. Y = 6.75

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

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

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

$$(I) \div (II)$$

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

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

$$(I) \div (III)$$

$$\frac{6 \times 10^{-5}}{1.2 \times 10^{-4}} = \left(\frac{1}{2}\right)^\gamma \Rightarrow \frac{1}{2} = \left(\frac{1}{2}\right)^\gamma \Rightarrow \gamma = 1$$

$$9 \times 10^{-5} = K[0.3]^\alpha [0.1]^\beta [0.1]^\gamma \quad \text{.....(IV)}$$

$$(I) \div (IV)$$

$$\frac{6 \times 10^{-5}}{9 \times 10^{-5}} = \left(\frac{2}{3}\right)^\alpha \Rightarrow \frac{2}{3} = \left(\frac{2}{3}\right)^\alpha \Rightarrow \alpha = 1$$

from(1)

$$6 \times 10^{-5} = K[0.2]^1 [0.1]^0 [0.1]^1$$

$$K = 3 \times 10^{-3}$$

$$Y \times 10^{-5} = 3 \times 10^{-3} [0.15]^1 [0.25]^0 [0.15]^1$$

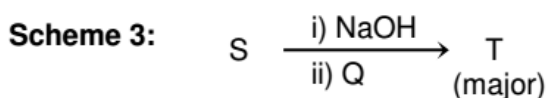
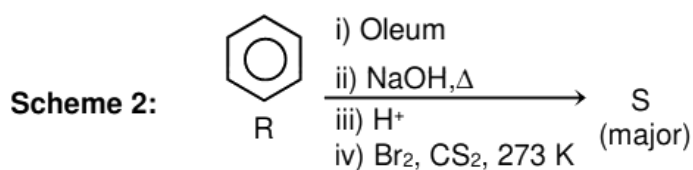
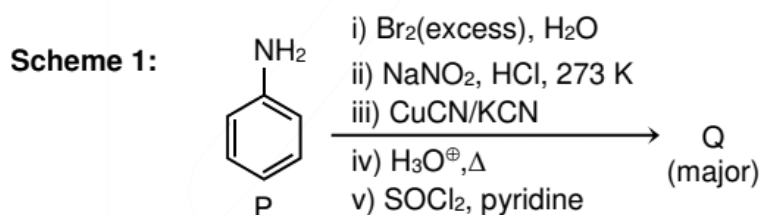
$$Y = \frac{3 \times 10^{-3} \times 15 \times 10^{-2} \times 15 \times 10^{-2}}{10^{-5}}$$

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

$$Y = 6.75$$

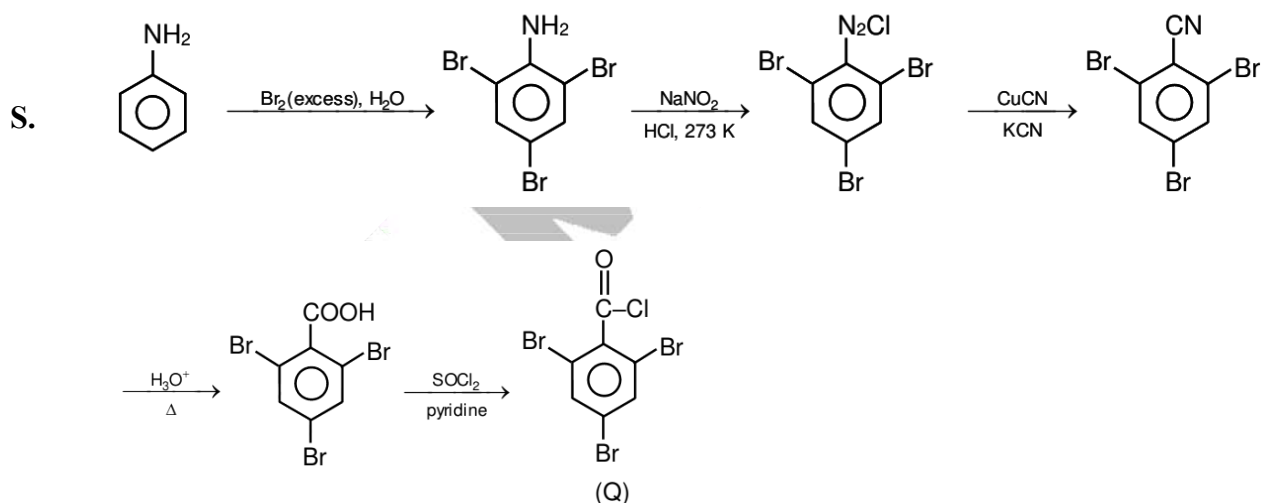
Carbonyl (aldehyde, ketone)

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 हैं। योजना 3 में T का संश्लेषण Q और S से दर्शाया गया है। T के एक अणु में Br परमाणुओं की कुल संख्या है _____

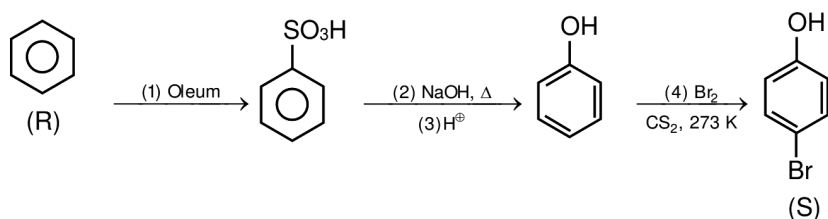


Ans. 4

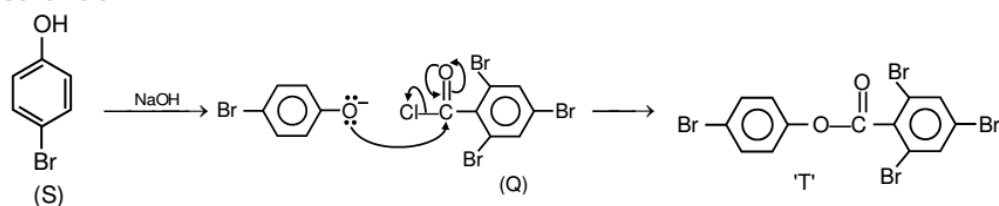
Scheme 1:



Scheme 2:



Scheme 3:



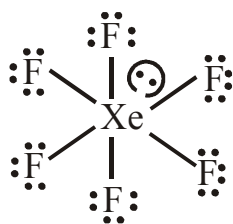
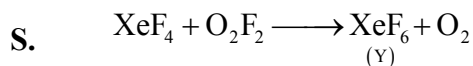
p-block(Noble gas family)

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



Total l.p. at $\text{XeF}_6 = 19$

Chemical bonding -II

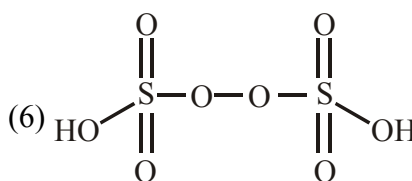
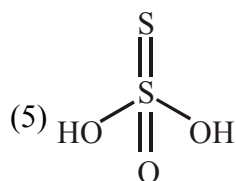
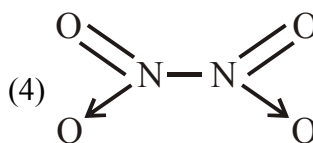
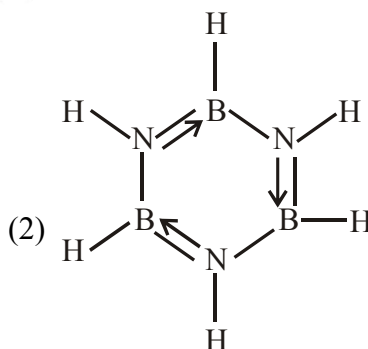
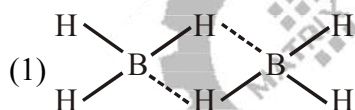
5. Among B_2H_6 , $\text{B}_3\text{N}_3\text{H}_6$, N_2O , N_2O_4 , $\text{H}_2\text{S}_2\text{O}_3$ and $\text{H}_2\text{S}_2\text{O}_8$, the total number of molecules containing covalent bond between two atoms of the same kind is _____

Question ID : 337911139

B_2H_6 , $\text{B}_3\text{N}_3\text{H}_6$, N_2O , N_2O_4 , $\text{H}_2\text{S}_2\text{O}_3$ और $\text{H}_2\text{S}_2\text{O}_8$ में से जिन अणुओं में दो समान परमाणुओं के बीच सहसंयोजक (covalent) आबन्ध है, उनकी कुल संख्या है _____

Ans. 4

S.



Solution

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 $5.12 \text{ K kg mol}^{-1}$, 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) $5.12 \text{ K kg mol}^{-1}$ है।)

Ans. 1.02 JEE ANS. 1.03 (0.97-1.06)*

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

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

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

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

$$\begin{aligned}\Delta T_f &= 5.12 \times \frac{1}{\frac{128}{39}} \times 1000 \\ &= 1.02\end{aligned}$$