

JEE MAIN (Session 2) 2023 Paper Analysis

CHEMISTRY | 8th April 2023 _ Shift-2



MOTION®

PRE-ENGINEERING
JEE (Main+Advanced)

PRE-MEDICAL
NEET

PRE-FOUNDATION
Olympiads/Boards

MYBIZKID
Learn to Lead

CORPORATE OFFICE

"Motion Education" 394, Rajeev Gandhi Nagar, Kota 324005 (Raj.)

Toll Free : 18002121799 | www.motion.ac.in | Mail : info@motion.ac.in

**MOTION
LEARNING APP**



Scan Code
for Demo Class

Continuing to keep the pledge
of imparting education for the last 16 Years

49600+
SELECTIONS SINCE 2007

JEE (Advanced)
9395

JEE (Main)
26591

NEET/AIIMS
11383
(Under 50000 Rank)

NTSE/OLYMPIADS
2235
(6th to 10th class)

Most Promising **RANKS**
Produced by MOTION Faculties

Nation's Best **SELECTION**
Percentage (%) Ratio

NEET / AIIMS

AIR-1 to 10
25 Times

AIR-11 to 50
83 Times

AIR-51 to 100
81 Times

JEE MAIN+ADVANCED

AIR-1 to 10
8 Times

AIR-11 to 50
32 Times

AIR-51 to 100
36 Times

Student Qualified
in NEET

(2022)

4837/5356 = **90.31%**

(2021)

3276/3411 = **93.12%**

Student Qualified
in JEE ADVANCED

(2022)

1756/4818 = **36.45%**

(2021)

1256/2994 = **41.95%**

Student Qualified
in JEE MAIN

(2022)

4818/6653 = **72.41%**

(2021)

2994/4087 = **73.25%**



NITIN VIJAY (NV Sir)
Founder & CEO

SECTION - A

Topic: Chemistry in everyday life

Level: Med

61. The statement/s which are true about antagonists from the following is/are :

- A. They bind to the receptor site
- B. Get transferred inside the cell for their action
- C. Inhibit the natural communication of the body
- D. Mimic the natural messenger.

Choose the correct answer from the options given below:

- (1) A and B (2) A and C (3) A, C and D (4) B only

Sol. 2

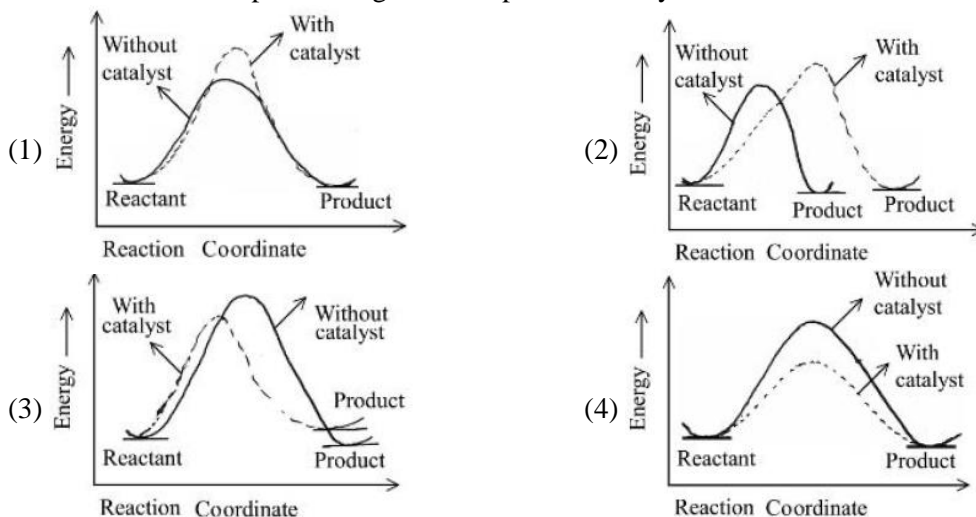
Antagonists bind to receptor site and inhibit the natural communication of both

Topic: Chemical kinetics

Sub: collision theory

Level: Easy

62. The correct reaction profile diagram for a positive catalyst reaction.



Sol. 4

Catalysts decrease activation energy only.

Topic :

Sub Topic :

Level :

63. Given below are two statements : One is labelled as **Assertion A** and other is labelled as **Reason R**

Assertion A : Sodium is about 30 times as abundant as potassium in the oceans.

Reason R : Potassium is bigger in size than sodium.

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

- (1) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
- (2) **A** is true but **R** is false
- (3) **A** is false but **R** is true
- (4) Both **A** and **R** are true and **R** is the correct explanation of **A**

Sol. 1

Due to bigger size of potassium, it forms more efficient lattices as compared to sodium with silicates.

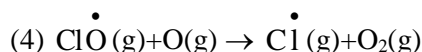
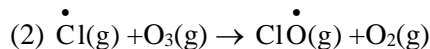
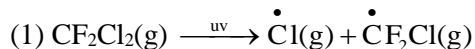
The abundance of sodium in ocean is more due to the more soluble nature of salt of sodium as compared to potassium salts.

Topic :

Sub Topic :

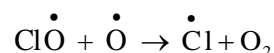
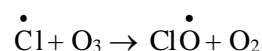
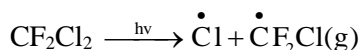
Level :

64. Which of these reactions is not a part of breakdown of ozone in stratosphere?



Sol. 3

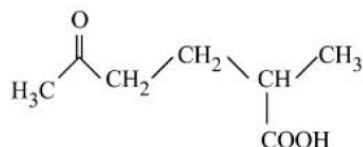
Ozone destruction



Topic: Nomenclature

Level: Easy

65. The correct IUPAC nomenclature for the following compound is :



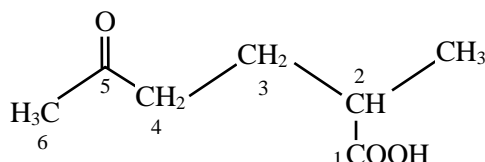
(1) 2-Methyl-5-oxohexanoic acid

(2) 2-Formyl-5-methylhexan-6-oic acid

(3) 5-Formyl-2-methylhexanoic acid

(4) 5-Methyl-2-oxohexan-6-oic acid

Sol. 1



2-Methyl-5-oxohexanoic acid

Topic :

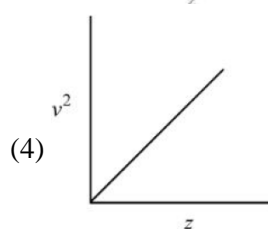
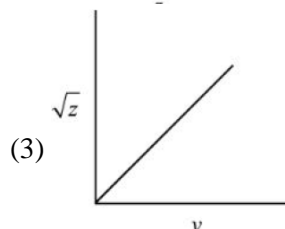
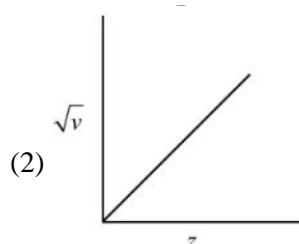
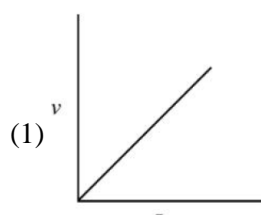
Sub Topic :

Level :

66. Henry Moseley studied characteristic X-ray spectra of elements. The graph which represents his observation correctly is

Given ν = frequency of X-ray emitted

Z = atomic number



Sol. 2

$$\sqrt{\nu} \propto Z$$

Topic :

Sub Topic :

Level :

67. Match list I with list II

List I Coordination complex		List II Number of unpaired electrons	
A.	$[\text{Cr}(\text{CN})_6]^{3-}$	I.	0
B.	$[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$	II.	3
C.	$[\text{Co}(\text{NH}_3)_6]^{3+}$	III.	2
D.	$[\text{Ni}(\text{NH}_3)_6]^{2+}$	IV.	4

Choose the correct answer from the options given below:

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

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

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

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

Sol. 1

For option (A)

$\text{Cr}^{+3} : 3d^3$

$\text{CN}^- \rightarrow \text{SFL}$

\Rightarrow No. of unpaired electrons = 3

For option (B)

$\text{Fe}^{+2} : 3d^6$

$\text{H}_2\text{O} : \text{WFL}$

No. of unpaired electrons = 4

For option (C)

$\text{Co}^{+3} : 3d^6$

$\text{NH}_3 : \text{SFL}$

No. of unpaired electrons = 0

For option (D)

$\text{Ni}^{+2} : 3d^8$

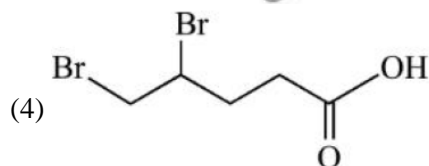
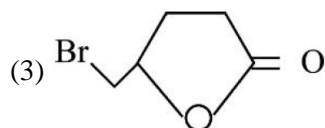
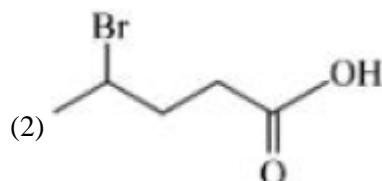
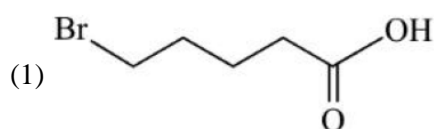
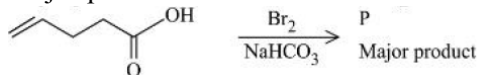
$\text{NH}_3 : \text{SFL}$

No. of unpaired electrons = 2

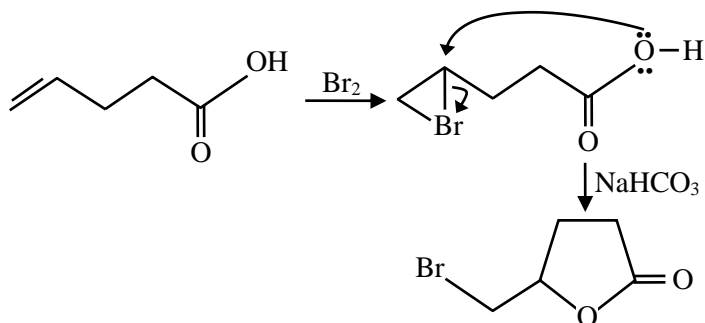
Topic: Hydrocarbon

Level: Med

68. Major product 'P' formed in the following reaction is :



Sol. 3



Topic :

Sub Topic :

Level :

69. For a good quality cement, the ratio of lime to the total of the oxides of Si, Al and Fe should be as close as to
 (1) 2 (2) 1 (3) 3 (4) 4

Sol. 1

$$\frac{\% \text{CaO}}{\% \text{SiO}_2 + \% \text{Al}_2\text{O}_3 + \% \text{Fe}_2\text{O}_3} = 1.9 - 2.1$$

Option (1) is correct.

Topic: Biomolecule

Level: Easy

70. Match list I with list II

List I		List II	
Natural amino acid		One letter code	
A.	Glutamic acid	I.	Q
B.	Glutamine	II.	W
C.	Tyrosine	III.	E
D.	Tryptophan	IV.	Y

Choose the correct answer from the options given below:

- (1) A-III, B-I, C-IV, D-II (2) A-IV, B-III, C-I, D-II
 (3) A-II, B-I, C-IV, D-III (4) A-III, B-IV, C-I, D-II

Sol. 1

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

Fact

Topic: Mole concept

Sub: Significant figures

Level: F

71. Which of the following have same number of significant figures ?

- A. 0.00253
 B. 1. 0003
 C. 15.0
 D. 163

Choose the correct answer from the options given below

- (1) B and C only (2) A, B and C only
 (3) A, C and D only (4) C and D only

Sol. 3

0.00253, 15.0, 163

All have three significant figures.

Topic: Qualitative

Sub:

Level:M

72. Given below are two statements :

Statement I : Methyl orange is a weak acid.

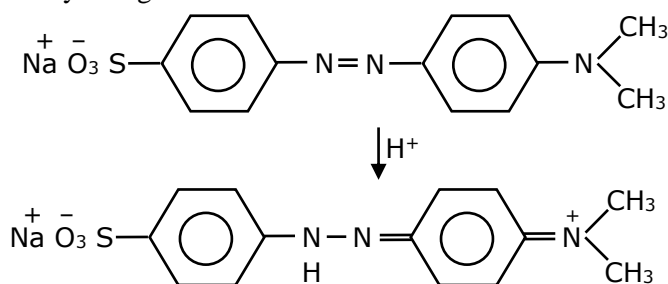
Statement II : The benzenoid form of methyl orange is more intense/deeply coloured than the quinonoid form.

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

- (1) Both statement I and statement II are incorrect
- (2) Both statement I and Statement II are correct
- (3) Statement I is correct but statement II is incorrect
- (4) Statement I is incorrect but statement II is correct

Sol. 1

(i) Methyl orange is weak base



(ii) Red color (quinonoid form)

So both statement are false

Topic: GOC

Level: Easy

73. The descending order of acidity for the following carboxylic acid is –

- A. CH_3COOH B. $\text{F}_3\text{C} - \text{COOH}$ C. $\text{ClCH}_2 - \text{COOH}$ D. $\text{BrCH}_2 - \text{COOH}$

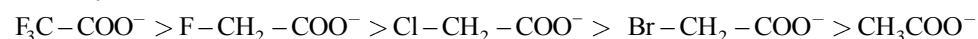
Choose the correct answer from the options given below:

- (1) $\text{D} > \text{B} > \text{A} > \text{E} > \text{C}$
- (2) $\text{B} > \text{D} > \text{C} > \text{E} > \text{A}$
- (3) $\text{E} > \text{D} > \text{B} > \text{A} > \text{C}$
- (4) $\text{B} > \text{C} > \text{D} < \text{E} > \text{A}$

Sol. 2

Acidity \propto stability of conjugate base

Stability order



Topic :

Sub Topic :

Level :

74. In Hall-Heroult process, the following is used for reducing Al_2O_3 :-

- (1) Magnesium (2) Graphite (3) Na_3AlF_6 (4) CaF_2

Sol. 2

In case of Hall's process, reduction of Al_2O_3 to Al can be done using graphite.

Topic: Real gas

Sub: Vanderwals constant

Level: M

75. Arrange the following gases in increasing order of van der waals constant 'a'

- A. Ar B. CH₄ C. H₂O D. C₆H₆

Choose the correct options from the following

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

Sol. 1

A \propto force of attraction vanderwaal force depends on molecular size and molecular mass and there is H-bonding in water, so correct option will be $A < B < C < D$.

Topic: Stoichiometry-II

Sub: titration

Level: M

76. Given below are two statement :

Statement I : In redox titration, the indicators used are sensitive to change in pH of the solution.

Statement II : In acid-base titration, the indicators used are sensitive to change in oxidation potential.

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

- (1) Both statement I and Statement II are incorrect
(2) Statement I is incorrect but Statement II is correct
(3) Statement I is correct but Statement II is incorrect
(4) Both Statement I and Statement II are correct

Sol. 1

Fact

Topic :

Sub Topic :

Level :

77. Which of the following can reduce decomposition of H₂O₂ on exposure to light

- (1) Dust (2) Urea
(3) Glass containers (4) Alkali

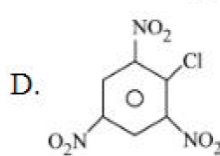
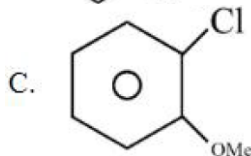
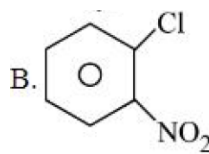
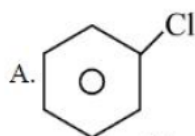
Sol. 2

Urea acts as a stabilizer in the decomposition of H₂O₂

Topic: Alkyl Halide

Level: M

78. The correct order of reactivity of following haloarenes towards nucleophilic substitution with aqueous NaOH is



Choose the correct answer from the options given below:

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

Sol. 1

$$\text{Rate} \propto \text{EWG} \propto \frac{1}{\text{EDG}}$$

$\text{NO}_2 \rightarrow -\text{M effect}$

$\text{OMe} \rightarrow +\text{M effect}$

Topic :

Sub Topic :

Level :

79. A compound 'X' when treated with phthalic anhydride in presence of concentrated H_2SO_4 yields 'Y'. 'Y' is used as an acid/base indicator. 'X' and 'Y' are respectively:

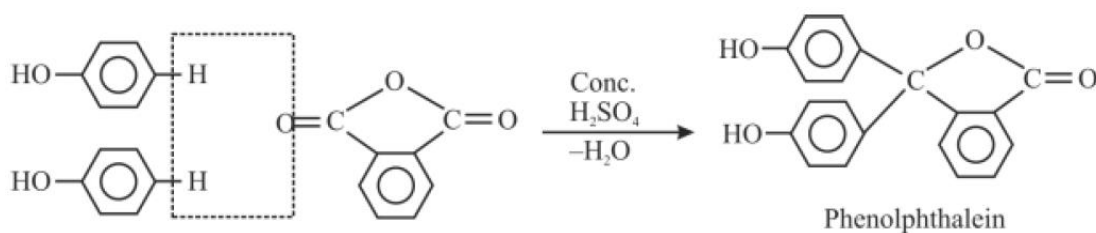
(1) Anisole, methyl orange

(2) Toluidine, Phenolphthalein

(3) Carboic acid, Phenolphthalein

(4) Salicylaldehyde, Phenolphthalein

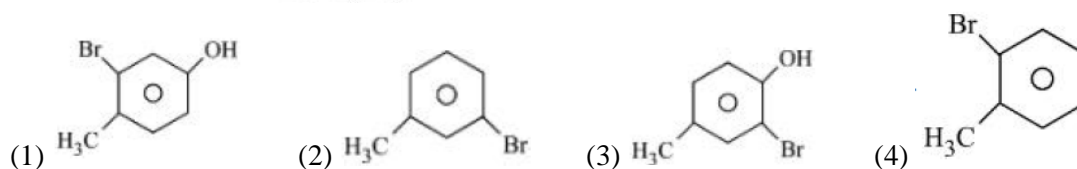
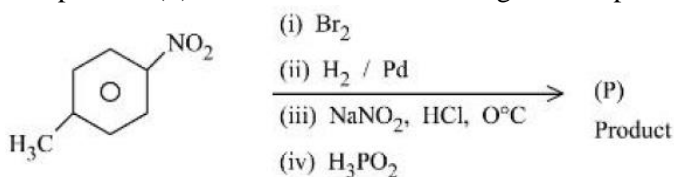
Sol. 3



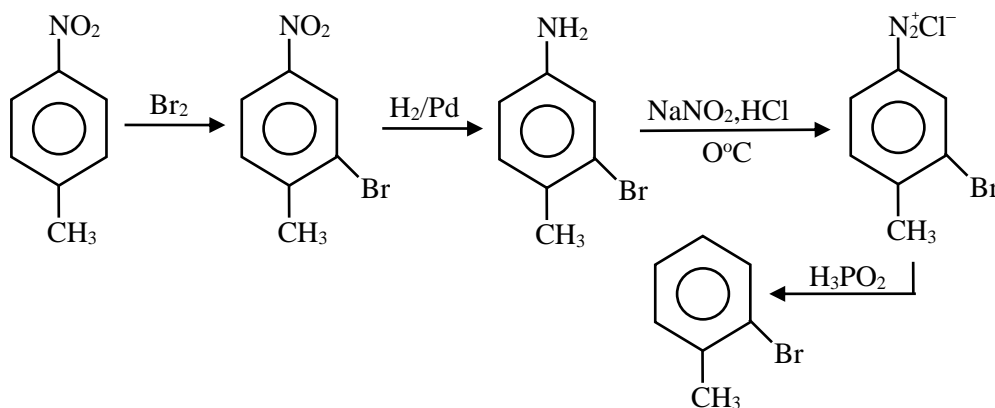
Topic: Nitrogen containing compound

Level: M

80. The product (P) formed from the following multistep reaction is :



Sol. 4



SECTION - B

Topic :

Sub Topic :

Level :

81. The observed magnetic moment of the complex $[\text{Mn}(\text{NCS})_6]^{x-}$ is 6.06 BM. The numerical value of x is _____

Sol. 4



Number of unpaired electron = 5

So, Mn must be in +2 oxidation state (Mn^{+2})

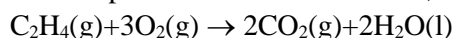
$$\Rightarrow 2 + (-6) = -x \quad \Rightarrow -4 = -x \quad \Rightarrow x = 4$$

Topic: Thermochemistry

Sub: bomb calorimetry

Level: M

82. For complete combustion of ethane,



The amount of heat produced as measured in bomb calorimeter is 1406 KJ mol^{-1} at 300K. The minimum value of ΔS needed to reach equilibrium is $(-)$ _____ KJ (Nearest integer)

Given : $R = 8.3 \text{ JK}^{-1}\text{mol}^{-1}$

Sol. 1411

$\Delta G = \Delta H - T\Delta S$ at equilibrium:-

$$\Delta G = 0$$

$$T\Delta S = \Delta H = \Delta U + \Delta n_g RT = -1406 + (-2) \times 8.3 \times 300 \times 10^{-3} = -1410.98 \approx 1411$$

Topic: Ionic equilibrium

Sub: solubility product

Level: Easy

83. The solubility product of BaSO_4 is 1×10^{-10} at 298 K. The solubility of BaSO_4 in 0.1 M $\text{K}_2\text{SO}_4(\text{aq})$ solution is _____ $\times 10^{-9} \text{ g L}^{-1}$ (Nearest integer)

Given: Molar mass of BaSO_4 is 233 g mol^{-1}

Sol. 233

$$K_{sp} = x(x + 0.1) = 10^{-10}$$

$$0.1x = 10^{-10}$$

$$x = 10^{-9} \text{ M}$$

$$x(\text{in g/l}) = 233 \times 10^{-9}$$

Topic: Atomic Structure

Sub: wave mechanical model

Level: Easy

84. The number of atomic orbitals from the following having 5 radial nodes is _____

7s, 7p, 6s, 8p, 8d

Sol. 3

No. of radial node

$$= n - \ell - 1$$

$$\text{For } 6s \rightarrow 6 - 0 - 1 = 5,$$

$$7p \rightarrow 7 - 1 - 1 = 5$$

$$8d \rightarrow 8 - 2 - 1 = 5$$

Topic: Electrochemistry

Sub: Thermodynamics of cell

Level: T

85. The number of incorrect statement from the following is _____

(1) The electrical work that a reaction can perform at constant pressure and temperature is equal to the reaction Gibbs energy

(2) E_{cell}° is dependent on the pressure

$$(3) \frac{dE_{\text{cell}}^{\circ}}{dT} = \frac{\Delta_r S^{\circ}}{nF}$$

(4) A cell is operating reversibly if the cell potential is exactly balanced by an opposing source of potential difference

Sol. 1

$$dG = vdp - sdT$$

$$dG = -sdT$$

$$\frac{dG}{dT} = -S \Rightarrow \frac{d\Delta G}{dT} = -\Delta S$$

$$\frac{dE^{\circ}}{dT} = \frac{-\Delta S}{-nF}$$

Topic: Surface chemi.

Sub: coagulation

Level: E

86. Coagulating value of the electrolytes AlCl_3 and NaCl for As_2S_3 are 0.09 and 50.04 respectively. The coagulating power of AlCl_3 is x times the coagulating power of NaCl . The value of x is _____

Sol. 556

$$\text{Coagulating power} \propto \frac{1}{\text{coagulation value}}$$

$$\frac{(\text{CP})_{\text{AlCl}_3}}{(\text{CP})_{\text{NaCl}}} = \frac{50.04}{0.09} = 556$$

Topic: Liquid solution

Sub: elvation ir boiling point

Level: E

87. If the boiling points of two solvents X and Y (having same molecular weights) are in the ratio 2 : 1 and their enthalpy of vaporizations are in the ratio 1 : 2, then the boiling point elevation constant of X is m times the boiling point elevation constant of Y. The value of m is _____ (nearest integer)

Sol. 8

$$K_b = \frac{RT_b^2 m}{1000 \Delta H_{\text{vap}}}$$

$$\frac{(K_b)_x}{(K_b)_y} = \frac{(T_b^2 M)_x}{(T_b^2 M)_y} \times \frac{(\Delta H)_y}{(\Delta H)_x} = \left(\frac{2}{1}\right)^2 \times \left(\frac{2}{1}\right) = \frac{8}{1}$$

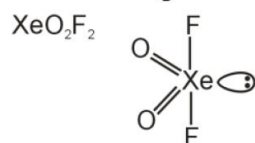
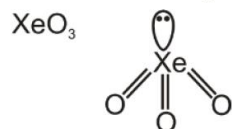
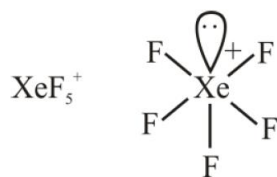
Topic :

Sub Topic :

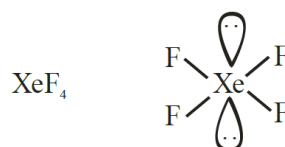
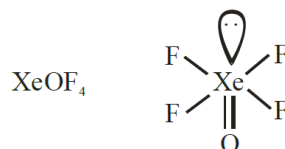
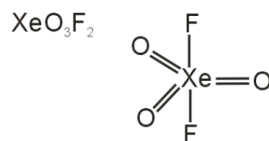
Level :

88. The number of species from the following carrying a single lone pair on central atom Xenon is _____
 XeF_5^+ , XeO_3 , XeO_2F_2 , XeF_5^- , XeO_3F_2 , XeOF_4 , XeF_4

Sol. 4



So, Answer is 4



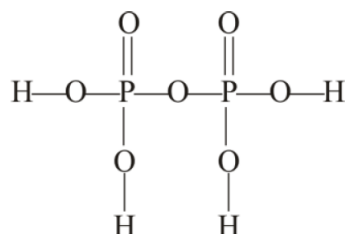
Topic :

Sub Topic :

Level :

89. The ratio of sigma and π bonds present in pyrophosphoric acid is _____

Sol. 6



$$\frac{\sigma}{\pi} = \frac{12}{2} = 6$$

So, Answer is 6

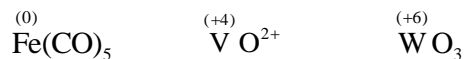
Topic :

Sub Topic :

Level :

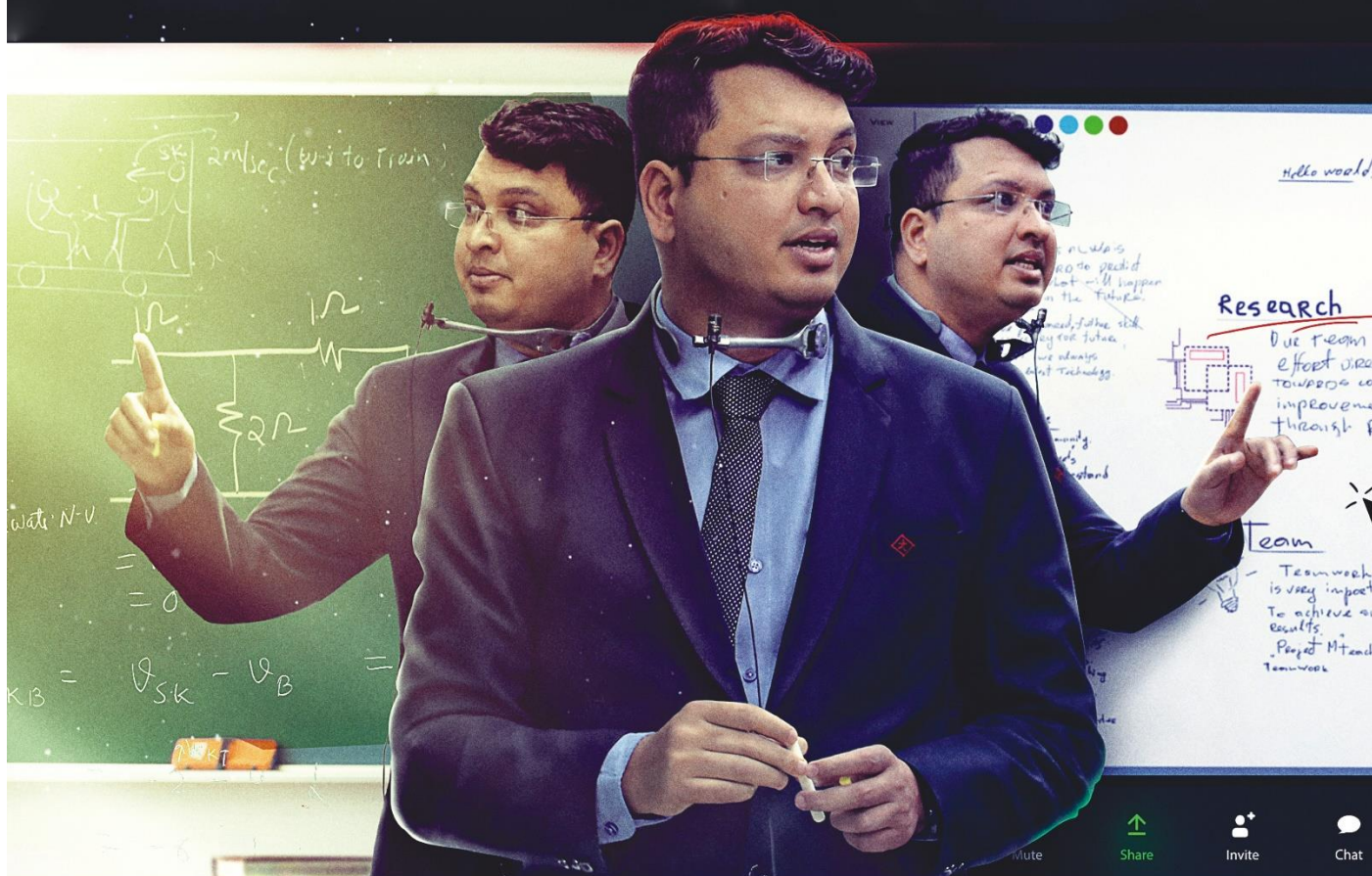
90. The sum of oxidation state of the metals in $\text{Fe}(\text{CO})_5$, VO^{2+} and WO_3 is _____

Sol. 10



So, Sum of oxidation state = $0 + 4 + 6 = 10$

Perfect mix of
CLASSROOM Program aided
with technology for sure **SUCCESS.**



Continuing the legacy
for the **last 16 years**



MOTION LEARNING APP

Get 7 days **FREE** trial & experience Kota Learning

MOTION[®]

HAR STUDENT KI CARE

**HAI JAHA
BHAROSA
HAI WAHA!**

मोशन है, तो भरोसा है

JEE | NEET | BOARD | OLYMPIADS



1800 212 1799

ADMISSIONS OPEN

