

JEE MAIN (Session 2) 2023 Paper Analysis

CHEMISTRY | 8th April 2023 _ Shift-1



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in NEET**

(2022)

$4837/5356 = 90.31\%$

(2021)

$3276/3411 = 93.12\%$

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in JEE ADVANCED**

(2022)

$1756/4818 = 36.45\%$

(2021)

$1256/2994 = 41.95\%$

**Student Qualified
in JEE MAIN**

(2022)

$4818/6653 = 72.41\%$

(2021)

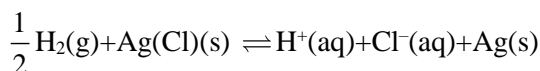
$2994/4087 = 73.25\%$



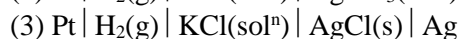
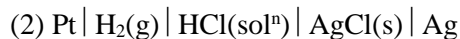
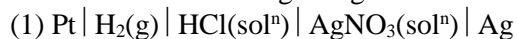
NITIN VIJAY (NV Sir)
Founder & CEO

SECTION - A

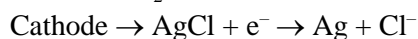
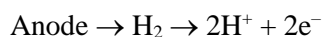
61. The reaction



occurs in which of the given galvanic cell.



Sol. 2



62. Sulphur (S) containing amino acids from the following are:

(a) isoleucine

(b) cysteine

(c) lysine

(d) methionine

(e) glutamic acid

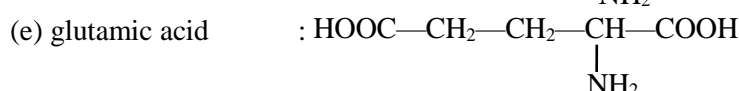
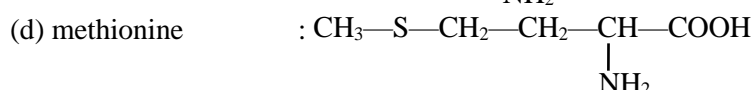
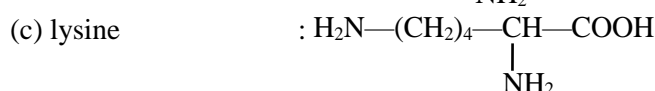
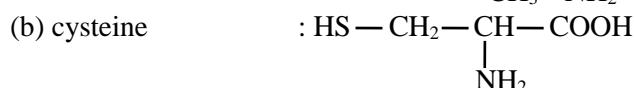
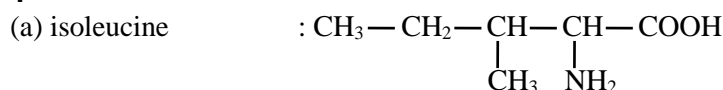
(1) b, c, e

(2) a, d

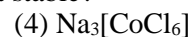
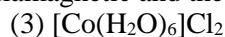
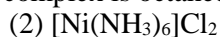
(3) a, b, c

(4) b, d

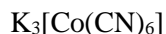
Sol. 4



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

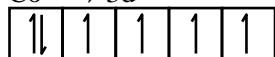
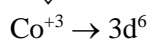


Sol. 1

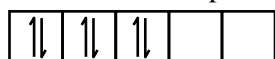


$$+3 + x - 6 = 0$$

$$x = +3$$



$\therefore \text{CN}^-$ is SFL so pairing occur so



$$u - e = 0$$



So diamagnetic

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

(1) Cu

(2) Au

(3) Pb

(4) Sn

Sol. 4

Sn due to Amphoteric nature.

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

- (1) $[\text{CoF}_6]^{3-} < [\text{MnBr}_4]^{2-} < [\text{Fe}(\text{CN})_6]^{3-} < [\text{Mn}(\text{CN})_6]^{3-}$
- (2) $[\text{Fe}(\text{CN})_6]^{3-} < [\text{CoF}_6]^{3-} < [\text{MnBr}_4]^{2-} < [\text{Mn}(\text{CN})_6]^{3-}$
- (3) $[\text{MnBr}_4]^{2-} < [\text{CoF}_6]^{3-} < [\text{Fe}(\text{CN})_6]^{3-} < [\text{Mn}(\text{CN})_6]^{3-}$
- (4) $[\text{Fe}(\text{CN})_6]^{3-} < [\text{Mn}(\text{CN})_6]^{3-} < [\text{CoF}_6]^{3-} < [\text{MnBr}_4]^{2-}$

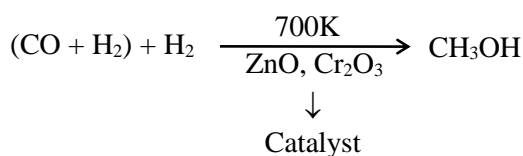
Sol. 4

$[\text{CoF}_6]^{3-}$	$[\text{MnBr}_4]^{2-}$	$[\text{Fe}(\text{CN})_6]^{3-}$	$[\text{Mn}(\text{CN})_6]^{3-}$
↓	↓	↓	↓
Co^{+3}	Mn^{+2}	$3d^5$	Mn^{+3}
F^- WFL	Br^- WFL	CN^- SFL	CN^- is SFL
So no pairing	So no pairing	Pairing occur	So pairing occur
$\uparrow\downarrow \uparrow \uparrow \uparrow \uparrow \uparrow$	$\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow$	$\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow$	$\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow$
		↓	
		$\uparrow\downarrow \uparrow\downarrow \uparrow \uparrow \uparrow$	
u.e. = 4	u.e. = 5	u.e. = 1	u.e. = 2
$[\text{Fe}(\text{CN})_6]^{3-} < [\text{Mn}(\text{CN})_6]^{3-} < [\text{CoF}_6]^{3-} < [\text{MnBr}_4]^{2-}$			

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

- (1) Methanoic acid
- (2) Methanal
- (3) Ethanol
- (4) Methanol

Sol. 4



67. $2\text{IO}_3^- + x\text{I}^- + 12\text{H}^+ \rightarrow 6\text{I}_2 + 6\text{H}_2\text{O}$

What is the value of x?

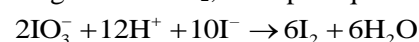
- (1) 12
- (2) 10
- (3) 2
- (4) 6

Sol. 2

n factor of IO_3^- and I^- in the given redox reaction are 5 and 1 respectively. Therefore, IO_3^- will always react in the molar ratio 1 : 5 to get I_2 .



To get 6 molar I_2 , multiple equation by 2

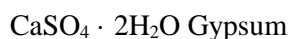


So, $x = 10$

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

- (1) To give a hard mass
- (2) To speed up the process of setting
- (3) To facilitate the hydration of cement
- (4) To slow down the process of setting

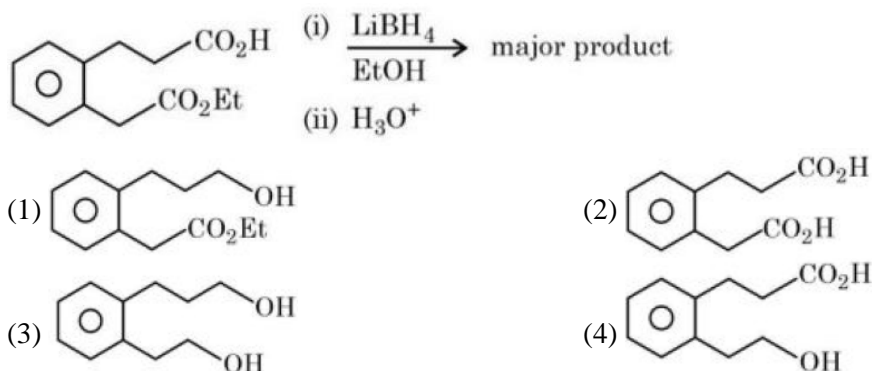
Sol. 4



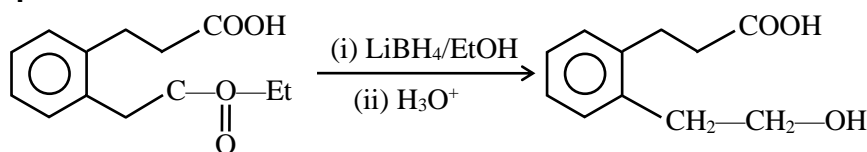
To slow down the process of setting.

Gypsum is added to control the 'setting of cement'. If not added, the cement will set immediately after mixing of water leaving no time the concrete placing.

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



Sol. 4



Note: Lithium borohydride is commonly used for selective reduction of esters and lactones to the corresponding alcohol.

70. Match list I with list II:

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

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

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

Sol. Bouns

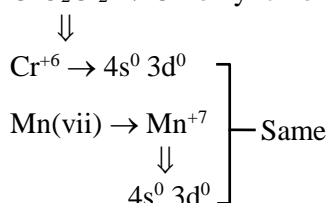
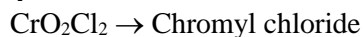
Data based

	Maximum allowed (ppm)
F^-	< 2 ppm
SO_4^{2-}	< 5 ppm
NO_3^-	< 50 ppm
Zn	< 500 ppm

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

- (1) Fe (III) (2) V (IV) (3) Ti (III) (4) Mn (VII)

Sol. 4



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

Assertion A : Butan-1-ol has higher boiling point than ethoxyethane.

Reason R : Extensive hydrogen bonding leads to stronger association of molecules.

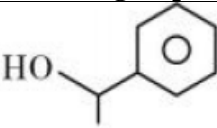

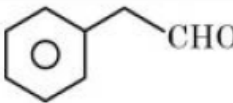
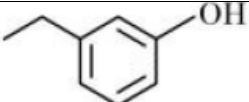
In the light of the above statements, choose the correct answer from the options given below:

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

Sol. 2

At comparable molecular mass, alcohol has higher b.p. than ether due to H-bond, because H-bond leads to stronger associated of molecules.

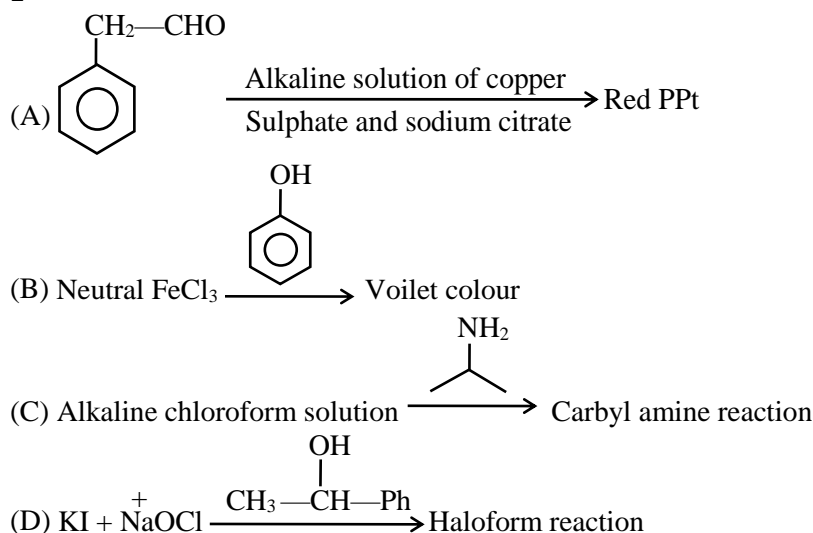
73. Match List I with List II:

List I (Reagents used)	List II (Compound with Functional group detected)
A. Alkaline solution of copper sulphate and sodium citrate	I. 
B. Neutral FeCl ₃ solution	II. 
C. Alkaline chloroform solution	III. 
D. Potassium iodide and sodium hypochlorite	IV. 

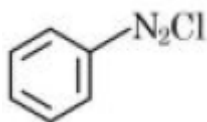
Choose the correct answer from the options given below:

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

Sol. 1



74. Match List I with List II:



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

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

Choose the correct answer from the options given below:

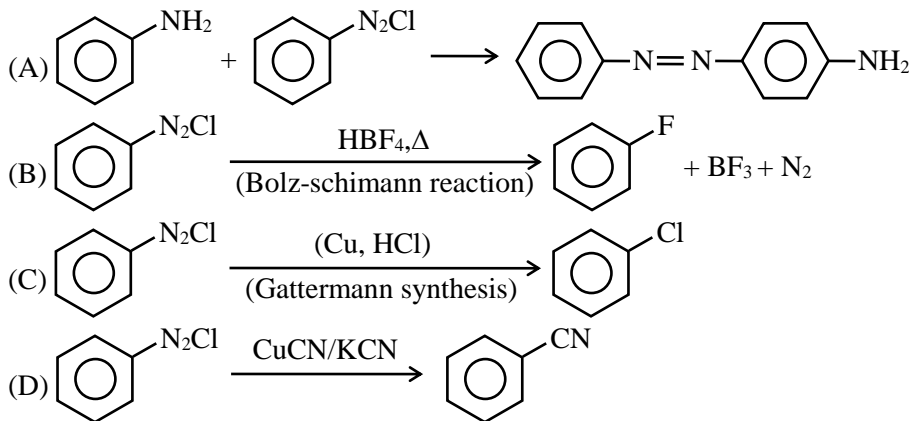
(1) A-I, B-III, C-IV, D-II

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

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

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

Sol. 3



75. Match List I with List II:

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

Choose the **correct** answer from the options given below:

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

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

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

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

Sol. 2

- (A) Saccharin \rightarrow First artificial sweetening agent
 (B) Aspartame \rightarrow Unstable at cooking temperature used in soft drink and cold drink.
 (C) Alitame \rightarrow High potency sweetener (2000 more sweeter than cane sugar)
 (D) Sucralose \rightarrow Stable at cooking temperature. Also it does not provide calories.

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

- (1) $P > Br > C > At$ (2) $C > P > At > Br$ (3) $Br > P > At > C$ (4) $Br > C > At > P$

Sol.

4

C (2.5)

P (2.1)

Br (2.8)

At (2.2)

$$\Rightarrow Br > C > At > P$$

77. Given below are two statements :

Statement I : Lithium and Magnesium do not form superoxide

Statement II : The ionic radius of Li^+ is larger than ionic radius of Mg^{2+}

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

(1) Statement I is correct but Statement II is incorrect

(2) Statement I is incorrect but Statement II is correct

(3) Both statement I and Statement II are correct

(4) Both statement I and Statement II are incorrect

Sol.

3 (Fact-based)

Due to small in size Li and Mg do not form superoxide.

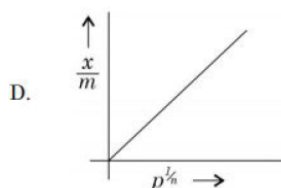
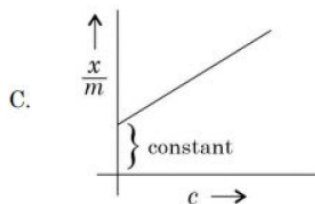
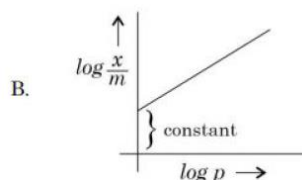
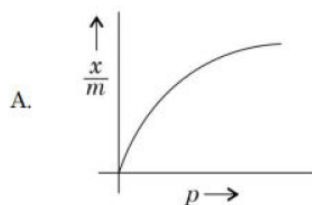
$Li^+ \geq Mg^{2+}$ - radius

$2e^-$ $10e^-$

↓

Due to diagonal relationship.

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



Choose the correct answer from the options given below:

(1) A, C, D only

(2) A, B only

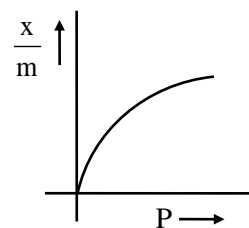
(3) A, B, D only

(4) B, C, D only

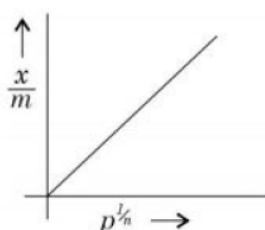
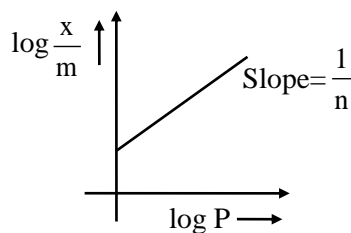
Sol.

3

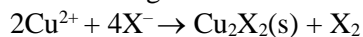
$$\frac{x}{m} = Kp^{1/n}$$



$$\log \frac{x}{m} = \log K + \frac{1}{n} \log P$$



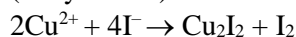
79. Which halogen is known to cause the reaction given below:



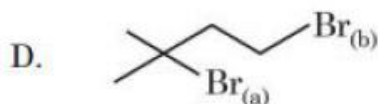
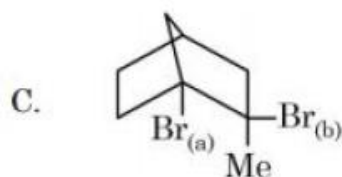
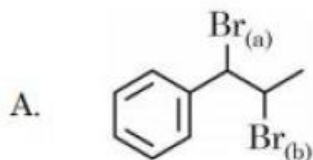
- (1) All halogens (2) Only chlorine (3) Only Bromine (4) Only Iodine

Sol. 4

(Only iodine)



80. Choose the halogen which is most reactive towards $\text{S}_{\text{N}}1$ reaction in the given compounds (A, B, C, & D)



(1) A-Br_(a) ; B-I_(a) ; C-Br_(b) ; D-Br_(a)

(2) A-Br_(b) ; B-I_(a) ; C-Br_(a) ; D-Br_(a)

(3) A-Br_(b) ; B-I_(b) ; C-Br_(b) ; D-Br_(b)

(4) A-Br_(a) ; B-I_(a) ; C-Br_(a) ; D-Br_(a)

Sol. 1

(A) → Because formed intermediate carbocation formed by Br_(a) get stabilised by conjugation with phenyl ring

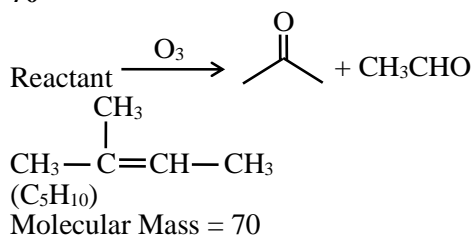
(B) → Because the intermediate carbocation formed by I_(a) become more stable by conjugation

(C) → Because, we can't remove Br_(a) from bridge head carbon (Bredt's rule)

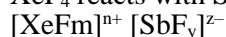
(D) → Because, formed intermediate by Br_(a), 3° carbocation is more stable (stability of carbocation 3° > 2° > 1°)

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

Sol. 70

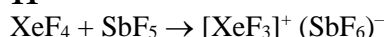


82. XeF_4 reacts with SbF_5 to form



$$m+n+y+z = \underline{\hspace{2cm}}$$

Sol. 11



$$m + n + x + y = 3 + 1 + 6 + 1 = 11$$

Xenon fluoride act as F^- donor and F^- acceptor.

83. The number of following statements which is/are incorrect is _____

- (1) Line emission spectra are used to study the electronic structure
- (2) The emission spectra of atoms in the gas phase show a continuous spread of wavelength from red to violet
- (3) An absorption spectrum is like the photographic negative of an emission spectrum
- (4) The element helium was discovered in the sun by spectroscopic method

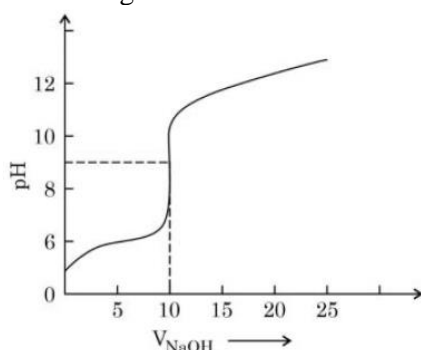
Sol. 1

Fact

84. The titration curve of weak acid vs. strong base with phenolphthalein as indicator) is shown below. The

$$K_{\text{phenolphthalein}} = 4 \times 10^{-10}$$

$$\text{Given : } \log 2 = 0.3$$



The number of following statements/s which is/are correct about phenolphthalein is _____

- (1) It can be used as an indicator for the titration of weak acid with weak base.
- (2) It begins to change colour at $pH = 8.4$
- (3) It is a weak organic base
- (4) It is colourless in acidic medium

Sol. 2

$$(B) \text{ } pK_n = -\log(4 \times 10^{-10}) = 9.4$$

Indicator range

$$\Rightarrow pK_n \pm 1$$

i.e. 8.4 to 10.4

(D) In acidic medium, phenolphthalein is in unionized form and is colourless.

- 85.** When a 60 W electric heater is immersed in a gas for 100s in a constant volume container with adiabatic walls, the temperature of the gas rises by 5°C. The heat capacity of the given gas is _____ J K⁻¹ (Nearest integer)

Sol. 1200

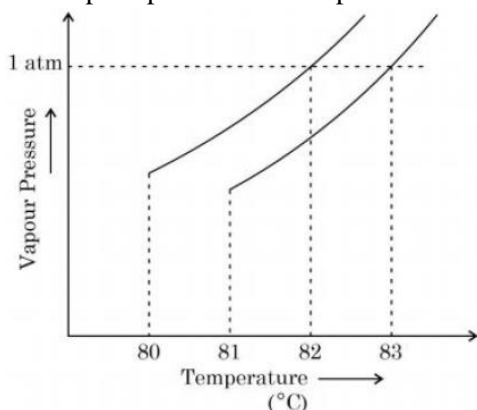
Adiabatic wall {no heat exchange between system and surrounding}

$$C_v \times \Delta T = P \times t/\text{sec}$$

$$C_v \times 5 = 60 \times 100$$

$$C_v = 1200$$

- 86.** The vapour pressure vs. temperature curve for a solution solvent system is shown below:



The boiling point of the solvent is _____ °C

Sol. 82

Boiling point of solvent is 82°C

Boiling point of solvent is 83°C

- 87.** 0.5 g of an organic compound (X) with 60% carbon will produce _____ × 10⁻¹ g of CO₂ on complete combustion.

Sol. 11

$$\text{Moles of carbon} = \frac{0.5 \times 0.6}{12}$$

$$\text{Moles of CO}_2 = \frac{0.5 \times 0.6}{12}$$

$$\text{Mass of CO}_2 = \frac{0.5 \times 0.6}{12} \times 44 = 11 \times 10^{-1} \text{ gram}$$

- 88.** The number of following factors which affect the percent covalent character of the ionic bond is _____

(1) Polarising power of cation

(2) Extent of distortion of anion

(3) Polarisability of the anion

(4) Polarising power of anion

Sol. 3

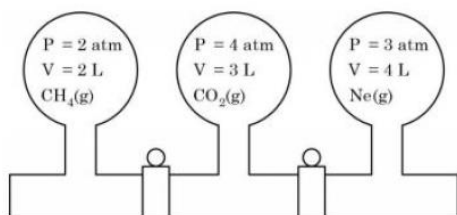
Percent covalent character of the ionic bond

(1) Polarising power of cation

(2) Extent of distortion of anion

(3) Polarisability of the anion

89.



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

Sol. 3

$$P_f V_f = P_1 V_1 + P_2 V_2 + P_3 V_3$$

$$P_f \times 9 = 2 \times 2 + 4 \times 3 + 3 \times 4$$

$$P_f = \frac{28}{9} = 3.11 \simeq 3$$

90. The number of given statements/s which is/are correct is _____

- (1) The stronger the temperature dependence of the rate constant, the higher is the activation energy.
- (2) If a reaction has zero activation energy, its rate is independent of temperature.
- (3) The stronger the temperature dependence of the rate constant, the smaller is the activation energy
- (4) If there is no correlation between the temperature and the rate constant then it means that the reaction has negative activation energy.

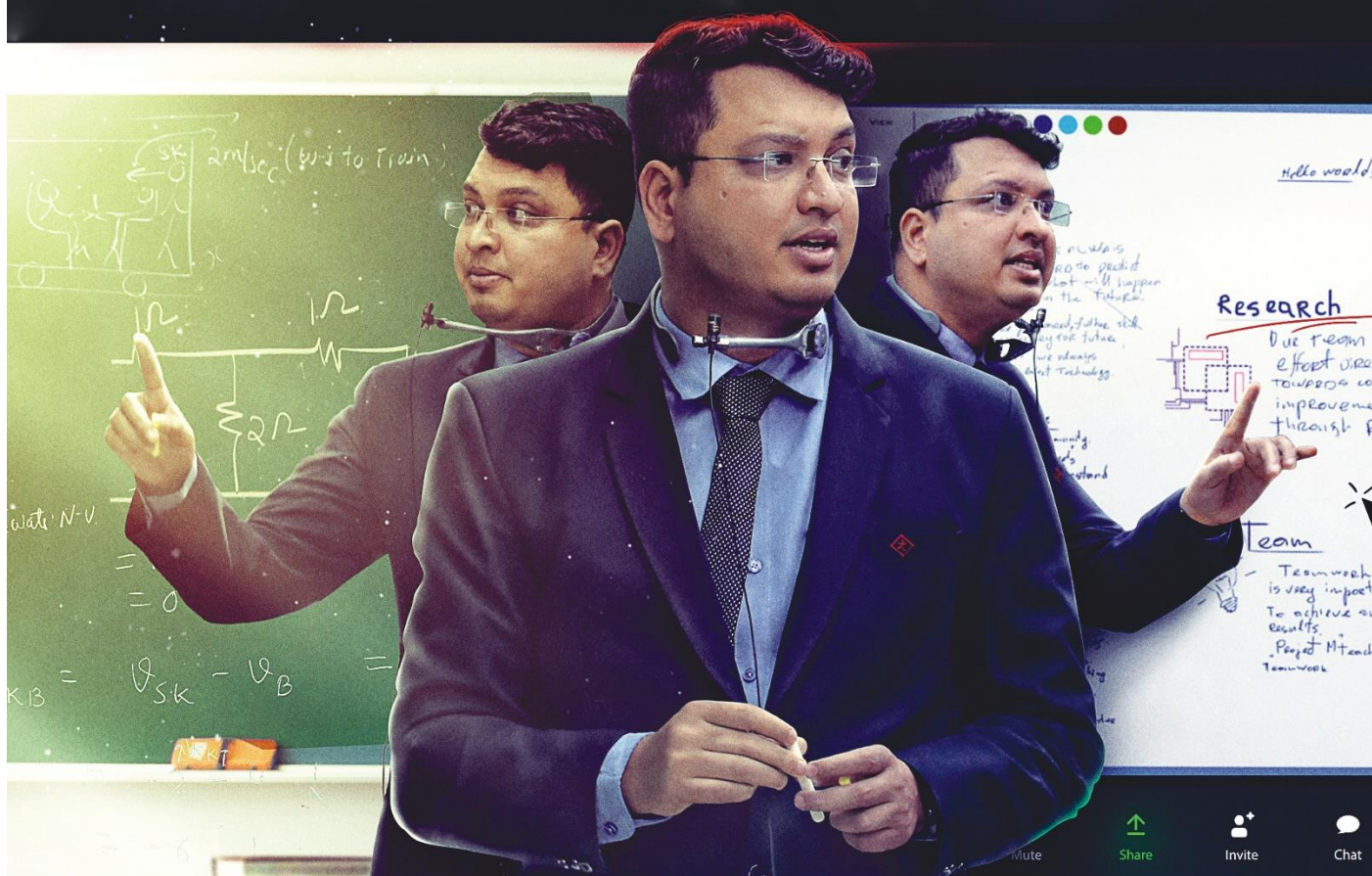
Sol. 2

Clearly, if $E_a = 0$, K is temperature independent

if $E_a > 0$, K increase with increase in temperature

if $E_a < 0$, K decrease with increase in temperature

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