IIT-JEE 2012 Question Paper 2 Key

PART II : CHEMISTRY

SECTION I : Single Correct Answer Type

This section contains **8 multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct**.

---

21. $NiCl_2\{P(C_2H_5)_2(C_6H_5)\}_2$ exhibits temperature dependent magnetic behaviour (paramagnetic / diamagnetic). The coordination geometries of Ni^{2+} in the paramagnetic and diamagnetic states are respectively

    (A) tetrahedral and tetrahedral
    (B) square planar and square planar
    (C) tetrahedral and square planar
    (D) square planar and tetrahedral

ANSWER : C

22. In the cyanide extraction process of silver from argentite ore, the oxidizing and reducing agents used are

    (A) O_2 and CO respectively.
    (B) O_2 and Zn dust respectively.
    (C) HNO_3 and Zn dust respectively.
    (D) HNO_3 and CO respectively.

ANSWER : B

23. The reaction of white phosphorus with aqueous NaOH gives phosphine along with another phosphorus containing compound. The reaction type; the oxidation states of phosphorus in phosphine and the other product are respectively

    (A) redox reaction; -3 and -5
    (B) redox reaction; $+3$ and $+5$
    (C) disproportionation reaction; -3 and $+5$
    (D) disproportionation reaction; -3 and $+3$

Zero Marks to all

IIT-JEE 2012 Question Paper 2 Key

CHEMISTRY

24. The shape of XeO_2F_2 molecule is

(A) trigonal bipyramidal (B) square planar

(C) tetrahedral (D) see-saw

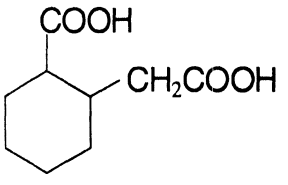
ANSWER : D

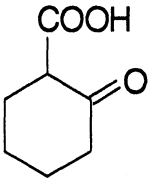
25. For a dilute solution containing 2.5 g of a non-volatile non-electrolyte solute in 100 g of water, the elevation in boiling point at 1 atm pressure is $2^{\circ}C$. Assuming concentration of solute is much lower than the concentration of solvent, the vapour pressure (mm of Hg) of the solution is (take $K_b = 0.76\, K\, kg\, mol^{-1}$)

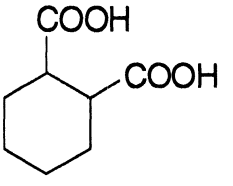
(A) 724 (B) 740 (C) 736 (D) 718

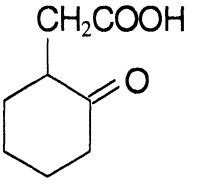
ANSWER : A

26. The compound that undergoes decarboxylation most readily under mild condition is

(A) 

(B) 

(C) 

(D) 

ANSWER : B

IIT-JEE 2012 Question Paper 2 Key

CHEMISTRY

27. Using the data provided, calculate the multiple bond energy (kJ mol^{-1}) of a C≡C bond in C_2H_2. That energy is (take the bond energy of a C–H bond as 350 kJ mol^{-1}.)

$2C(s) + H_2(g) \longrightarrow C_2H_2(g)$ $\quad \Delta H = 225$ kJ mol^{-1}

$2C(s) \longrightarrow 2C(g)$ $\quad \Delta H = 1410$ kJ mol^{-1}

$H_2(g) \longrightarrow 2H(g)$ $\quad \Delta H = 330$ kJ mol^{-1}

(A) 1165 (B) 837 (C) 865 (D) 815

ANSWER : D

28. The major product **H** of the given reaction sequence is

$$CH_3 - CH_2 - CO - CH_3 \xrightarrow{\ominus CN} \mathbf{G} \xrightarrow[\text{Heat}]{95\%\, H_2SO_4} \mathbf{H}$$

(A) $CH_3 - CH = \underset{\displaystyle CH_3}{\overset{\displaystyle |}{C}} - COOH$ (B) $CH_3 - CH = \underset{\displaystyle CH_3}{\overset{\displaystyle |}{C}} - CN$

(C) $CH_3 - CH_2 - \underset{\displaystyle CH_3}{\overset{\displaystyle OH}{\overset{|}{\underset{|}{C}}}} - COOH$ (D) $CH_3 - CH = \underset{\displaystyle CH_3}{\overset{\displaystyle |}{C}} - CO - NH_2$

ANSWER : A

IIT-JEE 2012 Question Paper 2 Key

CHEMISTRY

SECTION II : Paragraph Type

This section contains **6 multiple choice questions** relating to three paragraphs with **two questions on each paragraph**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

Paragraph for Questions 29 and 30

Bleaching powder and bleach solution are produced on a large scale and used in several household products. The effectiveness of bleach solution is often measured by iodometry.

29. Bleaching powder contains a salt of an oxoacid as one of its components. The anhydride of that oxoacid is

(A) Cl_2O (B) Cl_2O_7 (C) ClO_2 (D) Cl_2O_6

ANSWER : A

30. 25 mL of household bleach solution was mixed with 30 mL of 0.50 M KI and 10 mL of 4 N acetic acid. In the titration of the liberated iodine, 48 mL of 0.25 N $Na_2S_2O_3$ was used to reach the end point. The molarity of the household bleach solution is

(A) 0.48 M (B) 0.96 M (C) 0.24 M (D) 0.024 M

ANSWER : C

IIT-JEE 2012 Question Paper 2 Key

CHEMISTRY

Paragraph for Questions 31 and 32

The electrochemical cell shown below is a concentration cell.

$M \mid M^{2+}$ (saturated solution of a sparingly soluble salt, MX_2) $\| M^{2+}(0.001 \text{ mol dm}^{-3}) \mid M$

The emf of the cell depends on the difference in concentrations of M^{2+} ions at the two electrodes. The emf of the cell at 298 K is 0.059 V.

31. The solubility product (K_{sp}; $\text{mol}^3 \text{ dm}^{-9}$) of MX_2 at 298 K based on the information available for the given concentration cell is (take $2.303 \times R \times 298/F = 0.059$ V)

(A) 1×10^{-15} (B) 4×10^{-15} (C) 1×10^{-12} (D) 4×10^{-12}

ANSWER : B

32. The value of ΔG (kJ mol^{-1}) for the given cell is (take $1F = 96500 \text{ C mol}^{-1}$)

(A) -5.7 (B) 5.7 (C) 11.4 (D) -11.4

ANSWER : D

IIT-JEE 2012 Question Paper 2 Key

CHEMISTRY

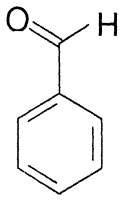
Paragraph for Questions 33 and 34

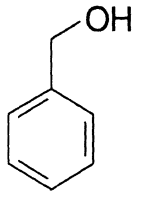
In the following reaction sequence, the compound **J** is an intermediate.

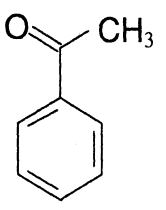
$$\mathbf{I} \xrightarrow[CH_3COONa]{(CH_3CO)_2O} \mathbf{J} \xrightarrow[(iii)\ \text{anhyd. } AlCl_3]{(i)\ H_2, Pd/C \\ (ii)\ SOCl_2} \mathbf{K}$$

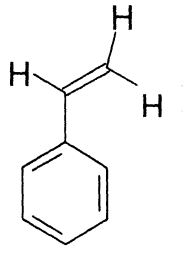
J ($C_9H_8O_2$) gives effervescence on treatment with $NaHCO_3$ and a positive Baeyer's test.

33. The compound **I** is

(A) 

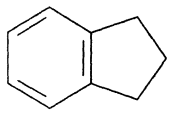
(B) 

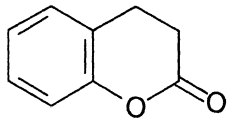
(C) 

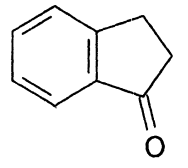
(D) 

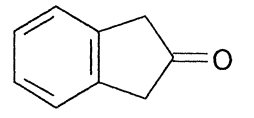
ANSWER : A

34. The compound **K** is

(A) 

(B) 

(C) 

(D) 

ANSWER : C

IIT-JEE 2012 Question Paper 2 Key

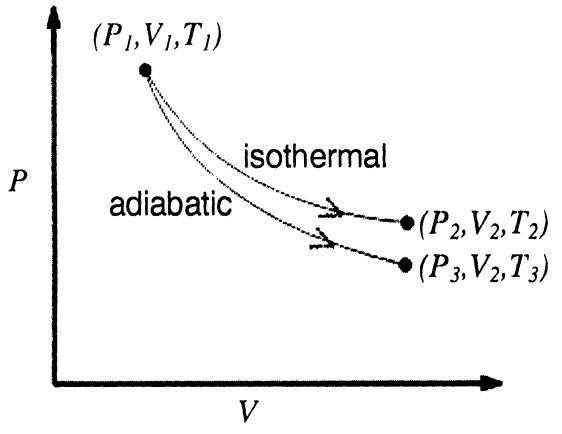
CHEMISTRY

SECTION III : Multiple Correct Answer(s) Type

This section contains **6 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONE or MORE are correct.**

---

35. The reversible expansion of an ideal gas under adiabatic and isothermal conditions is shown in the figure. Which of the following statement(s) is (are) correct?



(A) $T_1 = T_2$

(B) $T_3 > T_1$

(C) $w_{\text{isothermal}} > w_{\text{adiabatic}}$

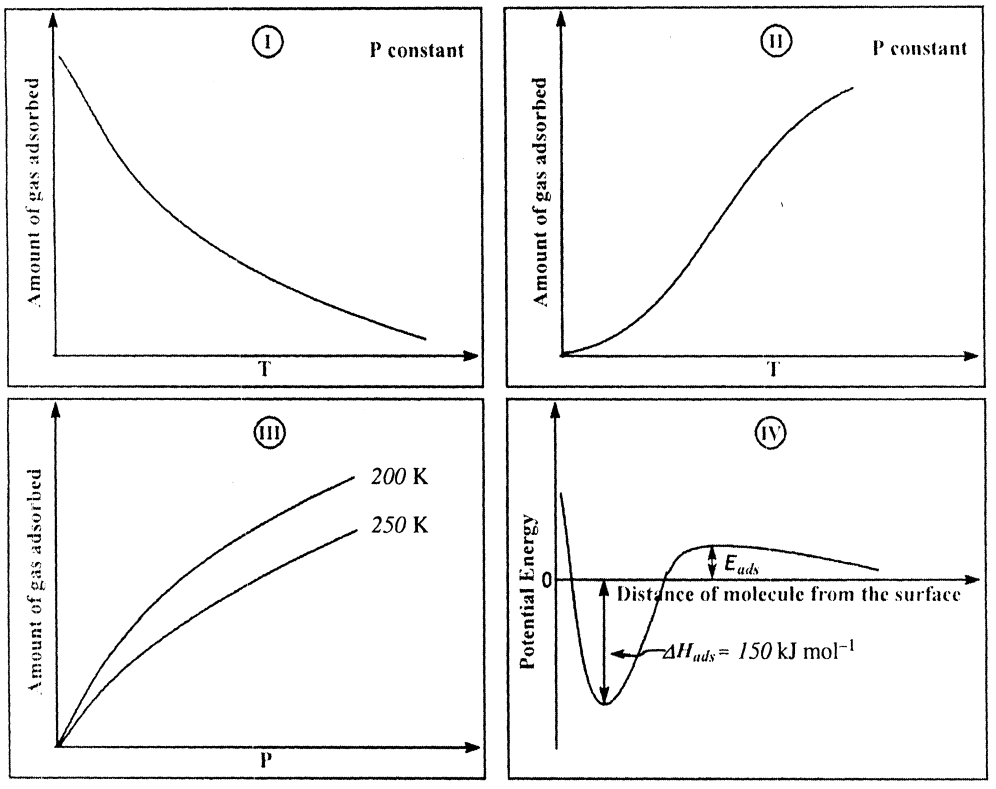
(D) $\Delta U_{\text{isothermal}} > \Delta U_{\text{adiabatic}}$

ANSWER : AD

IIT-JEE 2012 Question Paper 2 Key

CHEMISTRY

36. The given graphs / data **I, II, III** and **IV** represent general trends observed for different physisorption and chemisorption processes under mild conditions of temperature and pressure. Which of the following choice(s) about **I, II, III** and **IV** is (are) correct?



(A) **I** is physisorption and **II** is chemisorption

(B) **I** is physisorption and **III** is chemisorption

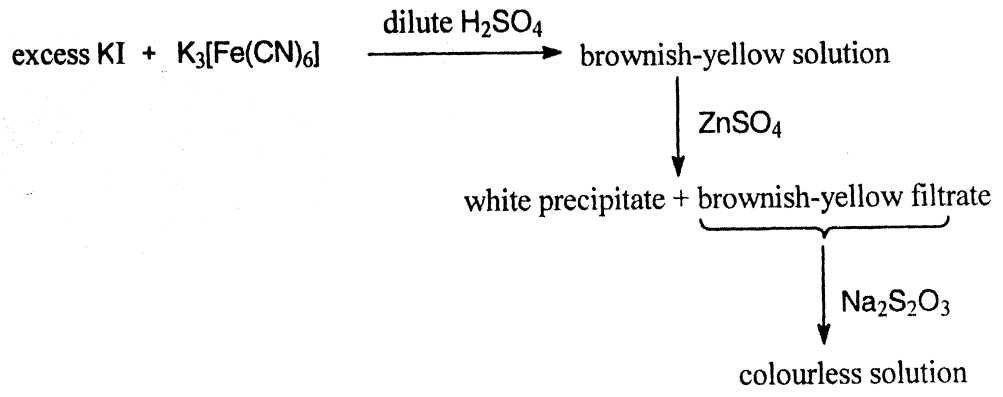
(C) **IV** is chemisorption and **II** is chemisorption

(D) **IV** is chemisorption and **III** is chemisorption

ANSWER : AC

CHEMISTRY

37. For the given aqueous reactions, which of the statement(s) is (are) true ?



(A) The first reaction is a redox reaction.

(B) White precipitate is $Zn_3[Fe(CN)_6]_2$.

(C) Addition of filtrate to starch solution gives blue colour.

(D) White precipitate is soluble in NaOH solution.

ANSWER : ACD

IIT-JEE 2012 Question Paper 2 Key

CHEMISTRY

38. With respect to graphite and diamond, which of the statement(s) given below is (are) correct ?

(A) Graphite is harder than diamond.

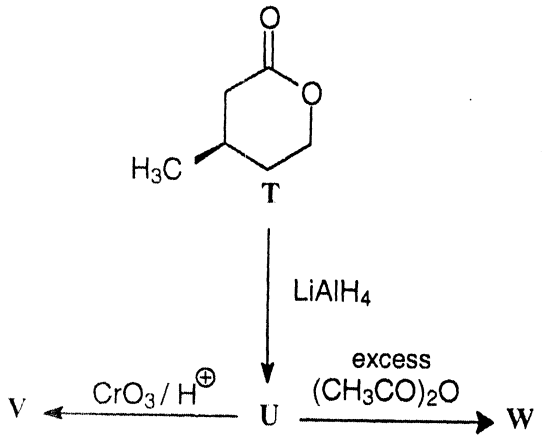
(B) Graphite has higher electrical conductivity than diamond.

(C) Graphite has higher thermal conductivity than diamond.

(D) Graphite has higher C-C bond order than diamond.

ANSWER : BD

39. With reference to the scheme given, which of the given statment(s) about **T, U, V** and **W** is (are) correct ?



(A) **T** is soluble in hot aqueous NaOH

(B) **U** is optically active

(C) Molecular formula of **W** is $C_{10}H_{18}O_4$

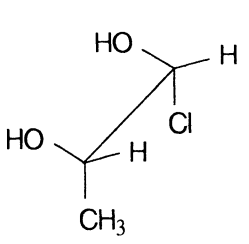
(D) **V** gives effervescence on treatment with aqueous $NaHCO_3$

ANSWER : ACD

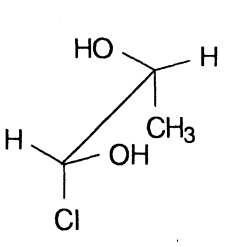
IIT-JEE 2012 Question Paper 2 Key

CHEMISTRY

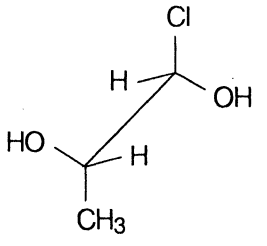
40. Which of the given statement(s) about **N**, **O**, **P** and **Q** with respect to **M** is (are) correct ?



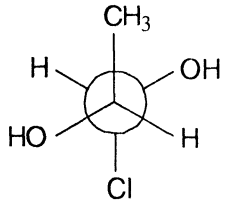
M



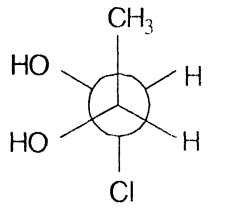
N



O



P



Q

(A) **M** and **N** are non-mirror image stereoisomers

(B) **M** and **O** are identical

(C) **M** and **P** are enantiomers

(D) **M** and **Q** are identical

ANSWER : ABC