TEST- 02

ULTIMATE KCET CRASH COURSE 2026

CHEMISTRY

Q1 Which of the following characteristic is not correct regarding alkali metals ?
(A) Low electronegativity
(B) Low melting point
(C) Their ions are isoelectronic with noble gas
(D) High ionisation energy

Q2 An element with atomic number 21 is a:
(A) Halogen
(B) Alkali metal
(C) Transition element
(D) Representative element

Q3 The third period (n = 3) begins at sodium with the addition of the first electron to:
(A) 3s orbital (B) 2p orbital
(C) 3p orbital (D) 2s orbital

Q4 Which molecule/ion out of the following does not contain unpaired electrons ?
(A) N_2^+ (B) O_2^{2-}
(C) B_2 (D) O_2

Q5 During the formation of a chemical bond:
(A) energy increases
(B) energy decreases
(C) electron-electron repulsion becomes more than the nucleus-electron attraction
(D) energy of the system does not change

Q6 Which of the following molecule does not show hydrogen bonding ?
(A) H_2O (B) H_2S
(C) HF (D) NH_3

Q7 The lattice enthalpy of an ionic compound is the enthalpy change which occurs when
(A) one gm of an ionic compound dissociates into its ions in a gaseous state.
(B) one mole of an ionic compound dissociates into its ions in a liquid state.
(C) one mole of an ionic compound dissociates into its ions in a gaseous state.
(D) one kg of an ionic compound dissociates into its ions in a liquid state.

Q8 Standard Molar Enthalpy of formation is:
(A) the standard enthalpy change for the formation of one mole of a compound from its elements in at a pressure of 10 bar and 30°C.
(B) the standard enthalpy change for the formation of one mole of a compound from its elements at a pressure of 2 bar and 25°C.
(C) the standard enthalpy change for the formation of one mole of a compound from its elements in their most stable states of aggregation.
(D) the standard enthalpy change for the formation of one kg of a compound from its elements in their most stable states of aggregation.

Q9 One of the reaction that takes place in producing steel from iron ore is the reduction of iron (II) oxide by carbon monoxide to give iron metal and CO_2.
$FeO(s) + CO(g) \rightleftharpoons Fe(s) + CO_2(g)$: $K_p = 0.265$ at 1050 K.
What are the equilibrium partial pressures of CO and CO_2 at 1050 K if the initial partial pressures are:
$P_{CO} = 1.4$ atm and $P_{CO_2} = 0.80$ atm?
(A) P_{CO_2} and P_{CO} = 0.416 atm and 1.135 atm
(B) P_{CO_2} and P_{CO} = 0.461atm and 1.739 atm
(C) P_{CO_2} and P_{CO} = 0.461atm and 0.739 atm
(D) P_{CO_2} and P_{CO} = 1.557atm and 2.739 atm

Q10 It has been found that the pH of a 0.01M solution of an organic acid is 4.15. Calculate the ionization constant of the acid, the concentration of the anion, and its pK_a.
(A) $K_a = 5.01 \times 10^{-7}, [A^-] = 7.08 \times 10^{-5}$ and $pK_a = 5.3007$
(B) $K_a = 5.01 \times 10^{-7}, [A^-] = 7.99 \times 10^{-5}$ and $pK_a = 7.5009$
(C) $K_a = 5.01 \times 10^{-7}, [A^-] = 7.39 \times 10^{-5}$ and $pK_a = 6.3001$
(D) $K_a = 5.01 \times 10^{-7}, [A^-] = 7.08 \times 10^{-5}$ and $pK_a = 6.3001$

Q11 When hydrochloric acid is added to cobalt nitrate solution at room temperature, the following reaction takes place and the reaction mixture becomes blue. On cooling the mixture it becomes pink. On the basis of this information mark the correct answer.

$$[Co(H_2O)6]^{3+}\underset{\text{pink}}{(aq)} + 4Cl^{-}\left(aq\right)$$

$$\rightleftharpoons \underset{\text{Blue}}{[CoCl_4]^{2-}(aq)} + 6H_2O\left(l\right)$$

(A) $\Delta H > 0$ for the reaction
(B) The sign of ΔH cannot be predicted on the basis of this information.
(C) $\Delta H < 0$ for the reaction
(D) $\Delta H = 0$ for the reaction

Q12 Consider the following chemical reaction

$$MnO_4^-(aq) + I^-(aq) \rightarrow MnO_2(s) + I_2(s)$$

Which of the following reactions is an oxidation half-reaction?
(A) $I^-(aq) \rightarrow I_2(s)$
(B) $Mno_4^-(aq) + I(aq) \rightarrow Mn_2O_2(s)$
(C) $Mno_4^-(aq) + I(aq) \rightarrow MnO_2(s)$
(D) Both $Mno_4^-(aq) + I(aq) \rightarrow MnO_2(s)$ and $I^-(aq) \rightarrow I_2(s)$

Q13 Assertion (A): In the reaction between potassium permanganate and potassium iodide, permanganate ions act as an oxidising agent.
Reason (R): Oxidation state of manganese changes from +2 to +7 during the reaction.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

Q14 How long a current of 3 amp has to be passed through a solution of $AgNO_3$ to coat a metal surface of 80 cm^2 with 0.005 mm thick layer? (Density of Ag is 10.5 g/cm^3: and at.mass is 108u)
(A) None of these (B) 125 sec.
(C) 62.5 sec. (D) 250 sec.

Q15 500 mL of an aqueous solution contains 0.1 mole of the solute AB; if its specific conductance is $\mathbf{X}$ S cm^{-1}, its molar conductance will be _____ S cm^2 mol^{-1}.
(A) 10X (B) X
(C) 200 X (D) 5000 X

Q16 $0.1MH_2SO_4$ is diluted to $0.01MH_2SO_4$ Hence, its molar conductance will be
(A) 1000 times (B) 10 times
(C) $\frac{1}{10}$th (D) 10000 times

Q17 Which of the following is the slope of the first order reaction in the plot of ln[R] vs. time ?
(A) $\frac{+k}{2{\cdot}303}$
(B) +k
(C) $\frac{-k}{2{\cdot}303}$
(D) –k

Q18 The instantaneous rate of disappearance of the MnO_4^- ion in the following reaction is $4.56 \times 10^{-3}\ Ms^{-1}$

$$2\,MnO_4^- + 10I^- + 16H^+ \rightarrow 2\,Mn^{2+} + 5I_2 + 8H_2O$$

The rate of appearance of I_2 is
(A) $5.7 \times 10^{-3}\ Ms^{-1}$
(B) $1.14 \times 10^{-2}\ Ms^{-1}$
(C) $1.14 \times 10^{-3}\ Ms^{-1}$
(D) $4.56 \times 10^{-4}\ Ms^{-1}$

Q19 Thermal decomposition of a compound is of first order. If 50% of a sample of a compound is decomposed in 120 min, the time taken for 90% completion is
(A) 400 min (B) 399 min
(C) 3988 min (D) 1000 min

Q20 The melting point of Zn is lower as compared to those of the other elements of 3d series because:
(A) d-electrons do not participate in metallic bonding.
(B) the d-orbitals are completely filled and d-electrons do not participate in metallic bonding both.
(C) the d-orbitals are completely filled.
(D) the d-orbitals are partially filled.

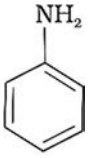
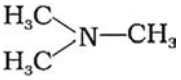
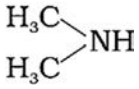
Q21 Out of $Fe^{2+}, Co^{2+}, Cr^{3+}, Ni^{2+}$ the one which shows highest magnetic moment is:
[Atomic number: Cr = 24, Fe = 26, Co = 27, Ni = 28]
(A) Co^{2+} (B) Fe^{2+}
(C) Ni^{2+} (D) Cr^{3+}

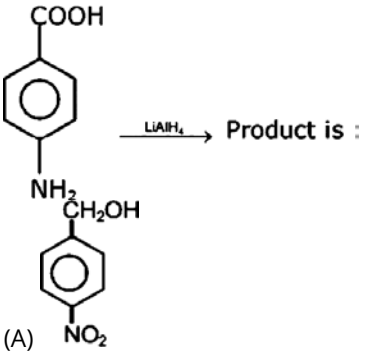
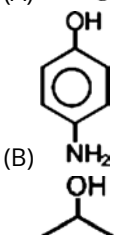
Q22 The product of the oxidation of I^- with MnO_4^- in alkaline medium is:
(A) IO_4^- (B) I_2
(C) IO_3^- (D) IO^-

Q23 Which of the following is an organometallic compound ?
(A) All of these (B) $Ti(OCOCH_3)_4$
(C) $Ti(C_2H_5)_4$ (D) $Ti(OC_2H_5)_4$

Q24 The kind of isomerism exhibited by $[Rh(en)_2Cl_2][Ir(en)Cl_4]$ and $[Ir(en)_3][RhCl_6]$ is:
(A) Coordination isomerism
(B) Linkage isomerism
(C) Position isomerism
(D) Ionisation isomerism

Q25 In which of the following configuration the possibility of both para & diamagnetism do not depend on the nature of ligands (CN = 6)
(A) d^7 (B) d^5
(C) d^3 (D) d^6

Q26 The most reactive amine towards dilute hydrochloric acid is _____.
(A) 
(B) 
(C) CH_3-NH_2
(D) 

Q27 
(A) 
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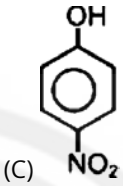
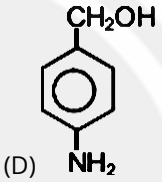
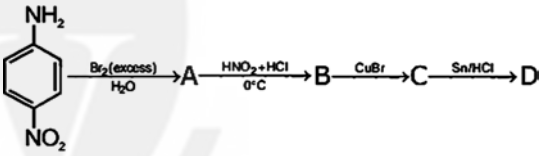
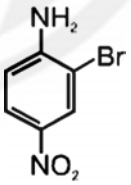
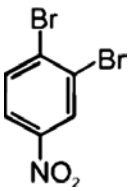
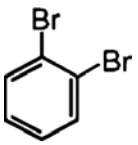
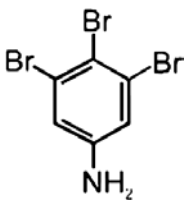
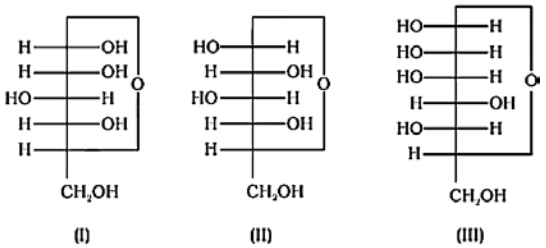
(C) 
(D) 

Q28 

What is the end product D?
(A) 
(B) 
(C) 
(D) 

Q29 Three cyclic structures of monosaccharides are given below which of these are anomers.



(I) (II) (III)

(A) I and II
(B) II and III
(C) I and III
(D) III is anomer of I and II

Q30 Which of the following is an example of a pentose sugar ?

(A) Glucose (B) Fructose
(C) Arabinose (D) Galactose

Answer Key

Q1	D
Q2	C
Q3	A
Q4	B
Q5	B
Q6	B
Q7	C
Q8	C
Q9	B
Q10	D
Q11	A
Q12	A
Q13	C
Q14	B
Q15	D
Q16	B
Q17	D
Q18	B
Q19	B
Q20	B
Q21	B
Q22	C
Q23	C
Q24	A
Q25	C
Q26	D
Q27	D
Q28	D
Q29	A
Q30	C

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

Alkali metals have the lowest ionization energy value in the respective period as losing an electron helps them achieve noble gas configuration.

Video Solution:

Q2 Text Solution:

The element is Scandium (Sc) with atomic number (Z) = 21

The electronic configuration of $_{21}Sc$ s [Ar] $3d^1$, $4s^2$. Hence, it is a transition element.

Video Solution:

Q3 Text Solution:

The electronic configuration of sodium is $1s^2$ $2s^2$ $2p^6$ $3s^1$. The valence electron is in 3s orbital.

Video Solution:

Q4 Text Solution:

For $0_2^2 : \sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \sigma 2\,pz^2$
$(\pi 2\,py^2 = \pi 2\,px^2)$,
$(\pi^* 2\,py^2 = \pi^* 2\,px^2)\sigma^* 2\,pz.$

There is no unpaired electrons.

Video Solution:

Q5 Text Solution:

A chemical bond results from the electrostatic force of attraction between atoms with opposite charges, or through the sharing of electrons as in the covalent bonds. When a bond forms, electrons are attracted to the space between nuclei where the electrostatic force of attraction is greater.

As the electrons fall to a position of lower potential energy, the total energy of the molecular system decreases.

Video Solution:

Q6 Text Solution:

Hydrogen bonding is seen between hydrogen covalently attached to electronegetive atom like O,N,F and an electronegetive atom H_2S does not show hydrogen bondingand hence it exists as a gas.

Video Solution:

Q7 Text Solution:

The lattice enthalpy of an ionic compound is the enthalpy change which occurs when one mole of an ionic compound dissociates into its ions in a gaseous state.

Video Solution:

Q8 Text Solution:

The standard enthalpy change for the formation of one mole of a compound from its elements in their most stable states of aggregation (reference states) is called standard molar enthalpy of formation.

Video Solution:

Q9 Text Solution:

For the given reaction;

$$\underset{1.4\ \text{atm}}{FeO\ CO}\left(g\right) = Fe\left(s\right) + \underset{0.80\ \text{atm}}{CO_2(g)}$$

$$Q_p = \frac{P_{CO_2}}{P_{CO}} = \frac{0.80}{1.4} = 0.571$$

It is given that $K_p = 0.265$

Since $Q_P > K_p$

The reaction will proceed in the backward reaction.

Therefore, we can say that the pressure of CO will increase while the pressure of CO_2 will decrease.

Now, let the increase in pressure of CO = decrease in pressure of CO_2 be P.

Then we can write

$$K_p = \frac{P_{CO_2}}{P_{CO}} = \frac{0.80-P}{1.4+P}$$

$$\Rightarrow 0.265 = \frac{0.80-P}{1.4+P}$$

$$\Rightarrow 0.265(1.4+P) = 0.80 - P$$

$$\Rightarrow 0.371 + 0.265P = 0.80 - P$$

$$\Rightarrow 1.265P = 0.429 \Rightarrow p = 0.339\ \text{atm}$$

Therefore, equilibrium partial pressure of CO_2 = 0.80 - 0.339= 0.461 atm

Also, equilibrium partial pressure of CO = 1.4 + 0.339 = 1.739 atm

Video Solution:

Q10 Text Solution:

$$pH = -\log\left[H^+\right]$$

$$4.15 = -\log\left[H^+\right]$$

$$\left[H^+\right] = 7.08 \times 10^{-5} = \left[A^-\right]$$

$$K_a = \frac{\left[H^+\right]\left[A^-\right]}{[HA]}$$

$$K_a = 5.01 \times 10^{-7}$$

$$pK_a = -\log\left[5.01 \times 10^{-7}\right] = 6.3001$$

Video Solution:

Q11 Text Solution:

For an endothermic reaction - If temperature is decreased reaction will shift to backward direction

$$\underset{\text{pink}}{\left[Co(H_2O)_6\right]^{3+}}\left(aq\right) + \underset{\text{colourless}}{4Cl^-\left(aq\right)}$$

$$\rightleftharpoons \underset{\text{Blue}}{[CoCl_4]^{2-}}(aq) + \underset{2}{6}H_2O\left(l\right)$$

At room temperature, the equilibrium mixture is blue due to $[CoCl_4]^{2-}$. When cooled in a freezing mixture, the colour of the mixture turns pink due to $[Co(H_2O)_6]^{3+}$.

Video Solution:

Q12 Text Solution:

In the reaction,

$MnO_4^-(aq) + I^-(aq) \rightarrow MnO_2(s) + I_2(s)$

Oxidation half-reaction: $I^-(aq) \rightarrow I_2(s)$

Reduction half-reaction: $MnO_4^-(aq) \rightarrow MnO_2(s)$

Video Solution:

Q13 Text Solution:

When permanganate ion reacts with I^- it forms MnO_2. the oxidation state of Mn changes from +7 to +4 in this reaction.

Video Solution:

Q14 Text Solution:

$\text{Volume} = \text{Area} \times \text{Thickness} = 80\ \text{cm}^2 \times 0.0005\ \text{cm} = 0.04\ \text{cm}^3$

The mass of silver needed can be calculated as:

$\text{Mass} = \text{Volume} \times \text{Density} = 0.04\ \text{cm}^3 \times 10.5\ \text{g/cm}^3 = 0.42\ \text{g}$

Applying faraday's 1st law

$w = Zit \quad \text{or} \quad \frac{\text{at.mass}}{nF} \times It$

$t = \frac{wnF}{i \times \text{at.mass}} = \frac{0.42 \times 1 \times 96500}{3 \times 108} = 125s$

Video Solution:

Q15 Text Solution:

To find the molar conductance, we use the formula:

$\text{Molar Conductance } (\Lambda_m) = \frac{\text{Specific Conductance } (\kappa)}{C} \times 1000$ where C is the concentration in moles per liter (mol/L).

The solution has a volume of 500 mL, which is 0.5 L.

The amount of solute is 0.1 moles, so the concentration C is:

$C = \frac{0.1 \text{ moles}}{0.5\ L} = 0.2\ \text{mol/L}$

$\Lambda_m = \frac{(\kappa)}{C} \times 1000$

$= \frac{X}{0.2} \times 1000 = 5000X$

Video Solution:

Q16 Text Solution:

The molar conductance of an electrolyte is inversely proportional to its concentration. When the concentration of the sulfuric acid solution is decreased from 0.1 M to 0.01 M, the concentration is reduced by a factor of 10.

Since molar conductance increases with dilution, the molar conductance at 0.01 M will be 10 times greater than that at 0.1 M.

Video Solution:

Q17 Text Solution:

–k

For a reaction of the type y=mx+c , slope is given as m

For a first order reaction $\underset{y}{\ln[R]} = \underset{\text{mx}}{-\text{kt}} + \underset{\text{C}}{\ln[R_0]}$,, slope will be -k

Video Solution:

Q18 Text Solution:

The given reaction is: $2\,MnO_4^- + 10I^- + 16H^+ \rightarrow 2\,Mn^{2+} + 5I_2 + 8H_2O$

The rate of disappearance of MnO_4^- is given as $4.56 \times 10^{-3}\ \text{mol}\ L^{-1}\ s^{-1}$. From the balanced equation, 2 moles of MnO_4^- produce 5 moles of I_2 So, the ratio of the rate of formation of I_2 to the rate of disappearance of MnO_4^- is:

$$\text{Rate of } I_2 = \left(\frac{5}{2}\right) \times \text{Rate of } MnO_4^-$$

$$= \frac{5}{2} \times 4.56 \times 10^{-3} = 11.4 \times 10^{-3} = 1.14 \times 10^{-2}\ \text{mol}\ L^{-1}\ s^{-1}$$

Hence, the correct answer is

Video Solution:

Q19 Text Solution:

Half-life of reaction = 120 min

$$\text{here, } k = \frac{0.693}{120}$$

$$\text{also, } t = \frac{2.303 \times 120}{0.693} \log 10^3$$

$$= \frac{2.303 \times 120 \times 3}{0.693} \log 10$$

$$\Rightarrow t = \frac{2.303 \times 120 \times 3 \times 1}{0.693} = 399$$

Video Solution:

Q20 Text Solution:

The melting point of Zn is lower compared to other 3d series elements because its d-orbitals are completely filled, which leads to a more stable electron configuration and less metallic bonding strength. Additionally, the d-electrons in Zn do not significantly contribute to metallic bonding, further reducing the melting point. Therefore, both reasons the d-orbitals are completely filled and d electrons do not participate in metallic bonding both explain why Zn has a lower melting point.

Video Solution:

Q21 Text Solution:

Higher no. of unpaired electron, higher the paramagnetic charecter

$Fe^{+2} \rightarrow d^6 \rightarrow 4$ unpaired e

$Co^{+2} \rightarrow d^7 \rightarrow 3$ unpaired e

$Ni^{+2} \rightarrow d^8 \rightarrow 2$ unpaired e

$Cr^{+3} \rightarrow d^3 \rightarrow 3$ unpaired e

Video Solution:

Q22 Text Solution:

in alkaline medium the reaction proceeds as shown below

$$2\,MnO_4^- + H_2O + I^- \rightarrow 2\,MnO_2 + 2\,OH^- + IO_3^-$$

Video Solution:

Q23 Text Solution:

A direct carbon-metal bond is a defining characteristic of organometallic compounds. $Ti(C_2H_5)_4$ has a metal carbon bond and meets the criteria for being an organometallic compound.

Video Solution:

Q24 Text Solution:

When there is the interchange of ligands between the cationic and anion species of different metal ions present in a complex, then coordination isomerism arises. Here we can find the interchange of en and Cl between Ir and Rh in the complexes.

Video Solution:

Q25 Text Solution:

d^3 configuration,

Irrespective of the ligand nature, d^3 remains paramagnetic

Video Solution:

Q26 Text Solution:

The greater will be the strength of the base, the greater will be its reactivity towards dilute HCl. Since aqueous soln will be formed in Dil.HCl, $(CH_3)_2NH$ secondary amine has the highest basic strength in aq. soln and hence has the highest reactivity.

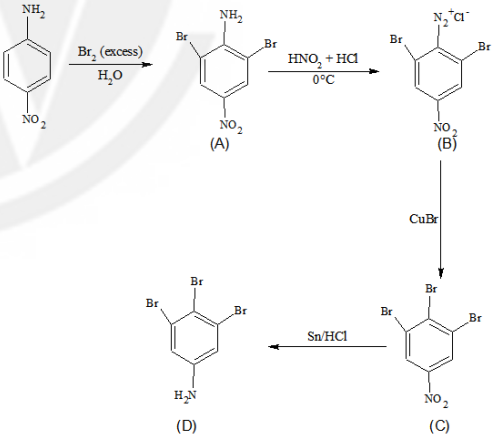
Video Solution:

Q27 Text Solution:

Lithium aluminum hydride reduces –COOH to $–CH_2OH$ but does not reduce NH_2

Video Solution:

Q28 Text Solution:



Video Solution:

Q29 Text Solution:

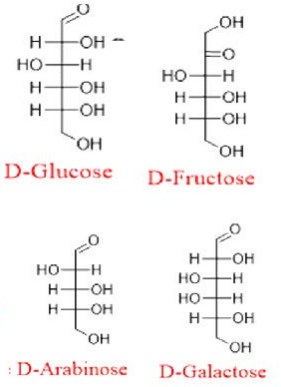
Isomeric cyclic structures of monosaccharides which differ in the structure at carbon- 1 position are known as anomers.

Here, I and II are anomer because they differ from each other at carbon- 1 only.

Video Solution:

Q30 Text Solution:

Arabinose is a five-carbon sugar, which classifies it as a pentose. In contrast, Fructose, Glucose, and Galactose are all six-carbon sugars, making them hexoses



Video Solution: