

2014

SUBJECT : CHEMISTRY	DAY-2
SESSION : AFTERNOON	TIME : 02.30 P.M. TO 03.50 P.M.

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
60	80 MINUTES	70 MINUTES

MENTION YOUR CET NUMBER	QUESTION BOOKLET DETAILS	
	VERSION CODE	SERIAL NUMBER
	A - 1	751905

DOs :

1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the invigilator after the 2nd Bell i.e., after 2.30 p.m.
3. The Serial Number of this question booklet should be entered on the OMR answer sheet.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'TS :

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. The 3rd Bell rings at 2.40 p.m., till then;
 - Do not remove the paper seal present on the right hand side of this question booklet.
 - Do not look inside this question booklet.
 - Do not start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 60 questions and each question will have one statement and four distracters. (Four different options / choices.)
2. After the 3rd Bell is rung at 2.40 p.m., remove the paper seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 70 minutes:
 - Read each question carefully.
 - Choose the correct answer from out of the four available distracters (options / choices) given under each question / statement.
 - **Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.**

Correct Method of shading the circle on the OMR answer sheet is as shown below :

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4. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognised and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
5. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
6. After the last bell is rung at 3.50 p.m., stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
7. Hand over the OMR ANSWER SHEET to the room invigilator as it is.
8. After separating the top sheet (Our Copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.



[Turn Over

SEAL

2014

1. 25 cm³ of oxalic acid completely neutralised 0.064 g of sodium hydroxide. Molarity of the oxalic acid solution is

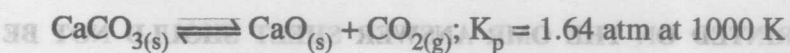
(1) 0.045	(2) 0.032
(3) 0.064	(4) 0.015
70 MINUTES	60 MINUTES
MAXIMUM MARKS	60

2. The statement that is NOT correct is

- (1) Energies of stationary states in hydrogen like atoms is inversely proportional to the square of the principal quantum number.
- (2) The radius of the first orbit of He⁺ is half that of the first orbit of hydrogen atom.

- (3) Angular quantum number signifies the shape of the orbital.
- (4) Total number of nodes for 3s orbital is three.

3. For the equilibrium :



50 g of CaCO₃ in a 10 litre closed vessel is heated to 1000 K. Percentage of CaCO₃ that remains unreacted at equilibrium is

(Given R = 0.082 L atm K⁻¹ mol⁻¹)

- (1) 50
- (2) 20
- (3) 40
- (4) 60

4. Conversion of oxygen into ozone is non-spontaneous at

- (1) high temperature
- (2) low temperature
- (3) all temperatures
- (4) room temperature

Space For Rough Work

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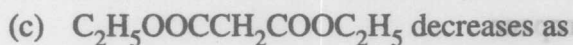
Preserve the replica of the OMR answer sheet for a minimum period of ONE year.



5. Density of carbon monoxide is maximum at

- (1) 0.5 atm and 273 K (2) 4 atm and 500 K
 (3) 2 atm and 600 K (4) 6 atm and 1092 K

6. The acid strength of active methylene group in



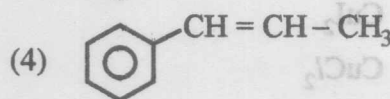
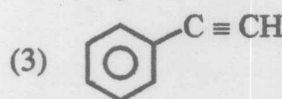
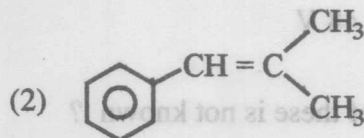
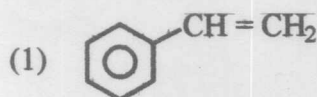
- (1) $a > b > c$ (2) $c > a > b$
 (3) $a > c > b$ (4) $b > a > c$

7. A metallic oxide reacts with water to form its hydroxide, hydrogen peroxide and also liberates oxygen. The metallic oxide could be

- (1) KO_2 (2) Na_2O_2
 (3) CaO (4) Li_2O

8. $\text{X} \xrightarrow[\text{(Reductive)}]{\text{Ozonolysis}} \text{Y} + \text{Z}$

Y can be obtained by Etard's reaction, Z undergoes disproportionation reaction with concentrated alkali. X could be



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9. Gold Sol is not

- (1) a lyophobic colloid (2) negatively charged colloid
 (3) a macro molecular colloid (4) a multimolecular colloid

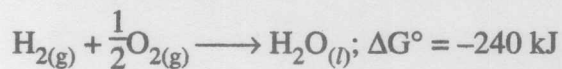
10. Carbocation as an intermediate is likely to be formed in the reaction :

- (1) Acetone + HCN $\xrightarrow{-OH}$ acetonecyanohydrin
 (2) Hexane $\xrightarrow{\text{Anhy. AlCl}_3 / \text{HCl}}$ 2-methyl pentane
 (3) Propene + Cl₂ $\xrightarrow{h\nu}$ 2-chloropropane
 (4) Ethylbromide + Aq KOH $\xrightarrow{\Delta}$ ethyl alcohol

11. For an ideal binary liquid mixture

- (1) $\Delta H_{(mix)} = 0; \Delta S_{(mix)} < 0$ (2) $\Delta S_{(mix)} > 0; \Delta G_{(mix)} < 0$
 (3) $\Delta S_{(mix)} = 0; \Delta G_{(mix)} = 0$ (4) $\Delta V_{(mix)} = 0; \Delta G_{(mix)} > 0$

12. For hydrogen - oxygen fuel cell at one atm and 298 K

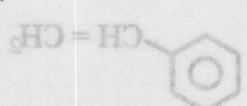



E° for the cell is approximately,

(Given F = 96,500 C)

- (1) 1.24 V (2) 1.26 V
 (3) 2.48 V (4) 2.5 V

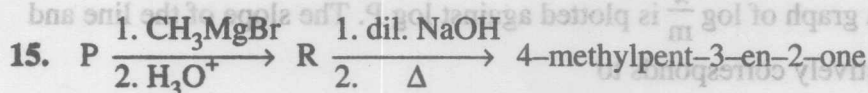
13. Which one of these is not known ?

- (1)  (1) (2)  (2)
 (3)  (3) (4)  (4)

Space For Rough Work

14. The correct statement is

- (1) The extent of actinoid contraction is almost the same as lanthanoid contraction.
- (2) Ce^{+4} in aqueous solution is not known.
- (3) The earlier members of lanthanoid series resemble calcium in their chemical properties.
- (4) In general, lanthanoids and actinoids do not show variable oxidation states.



P is

- | | |
|----------------|-------------------|
| (1) ethanamine | (2) ethanal |
| (3) propanone | (4) ethanenitrile |

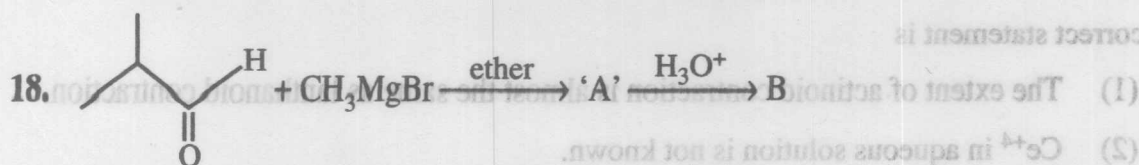
16. When $CH_2 = CH - O - CH_2 - CH_3$ reacts with one mole of HI, one of the products formed is

- | | |
|-------------|----------------|
| (1) ethanol | (2) ethanal |
| (3) ethane | (4) iodoethene |

17. 0.44 g of a monohydric alcohol when added to methylmagnesium iodide in ether liberates at S.T.P., 112 cm^3 of methane. With PCC the same alcohol forms a carbonyl compound that answers silver mirror test. The monohydric alcohol is

- | | |
|---|--|
| (1) $(CH_3)_3C - CH_2OH$ | (2) $(CH_3)_2CH - CH_2OH$ |
| (3) $\begin{array}{c} CH_3 - CH - CH_2 - CH_3 \\ \\ OH \end{array}$ | (4) $\begin{array}{c} CH_3 - CH - CH_2 - CH_2 - CH_3 \\ \\ OH \end{array}$ |

Space For Rough Work



The IUPAC name of 'B' is

- (1) 2-methylbutan-3-ol (2) Pentan-2-ol
 (3) 3-methylbutan-2-ol (4) 2-methylbutan-2-ol

19. For Freundlich isotherm a graph of $\log \frac{x}{m}$ is plotted against $\log P$. The slope of the line and its y-axis intercept, respectively corresponds to

- (1) $\log \frac{1}{n}, k$ (2) $\log \frac{1}{n}, \log k$
 (3) $\frac{1}{n}, k$ (4) $\frac{1}{n}, \log k$

20. A plot of $\frac{1}{T}$ Vs. k for a reaction gives the slope -1×10^4 K. The energy of activation for the reaction is

(Given $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$)

- (1) $1.202 \text{ kJ mol}^{-1}$ (2) $83.14 \text{ kJ mol}^{-1}$
 (3) 8314 J mol^{-1} (4) 12.02 J mol^{-1}

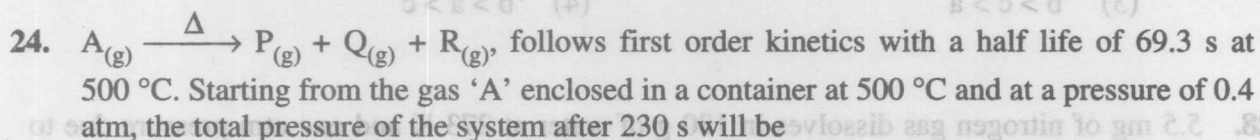
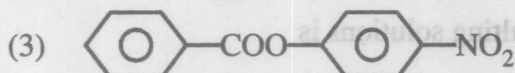
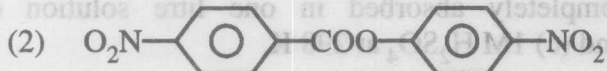
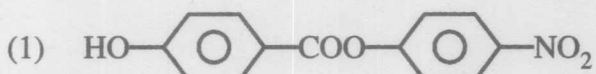
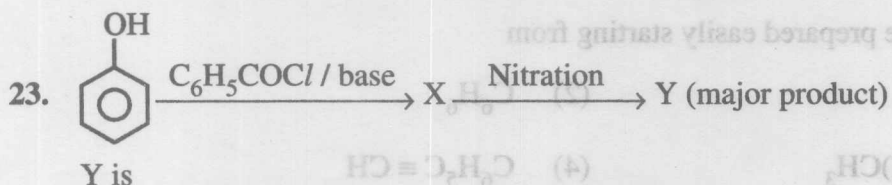
21. The IUPAC name of the complex ion formed when gold dissolves in aquaregia is

- (1) tetrachloridoaurate(I) (2) dichloridoaurate(III)
 (3) tetrachloridoaurate(III) (4) tetrachloridoaurate(II)

22. The correct sequence of reactions to be performed to convert benzene into m-bromoaniline is

- (1) bromination, nitration, reduction (2) reduction, nitration, bromination
 (3) nitration, reduction, bromination (4) nitration, bromination, reduction

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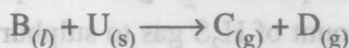
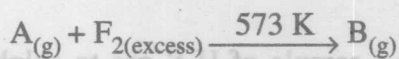
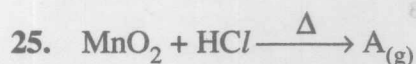


(1) 1.32 atm

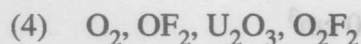
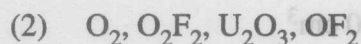
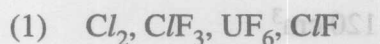
(2) 1.12 atm

(3) 1.15 atm

(4) 1.22 atm



The gases A, B, C and D are respectively



Space For Rough Work

26. Acetophenone cannot be prepared easily starting from

- (1) $C_6H_5CH_3$ (2) C_6H_6
 (3) $C_6H_5CH(OH)CH_3$ (4) $C_6H_5C \equiv CH$

27. One mole of ammonia was completely absorbed in one litre solution each of
 (a) 1M HCl, (b) 1M CH_3COOH and (c) 1M H_2SO_4 at 298 K.

The decreasing order for the pH of the resulting solutions is

(Given $K_b(NH_3) = 4.74$)

- (1) $a > b > c$ (2) $c > b > a$
 (3) $b > c > a$ (4) $b > a > c$

28. 5.5 mg of nitrogen gas dissolves in 180 g of water at 273 K and one atm pressure due to nitrogen gas. The mole fraction of nitrogen in 180 g of water at 5 atm nitrogen pressure is approximately

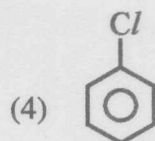
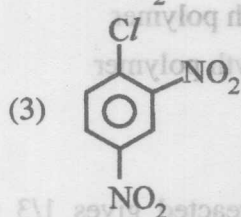
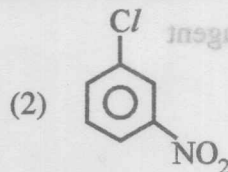
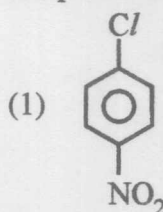
- (1) 1×10^{-5} (2) 1×10^{-4}
 (3) 1×10^{-6} (4) 1×10^{-3}

29. 50 cm^3 of 0.04 M $K_2Cr_2O_7$ in acidic medium oxidizes a sample of H_2S gas to sulphur. Volume of 0.03 M $KMnO_4$ required to oxidize the same amount of H_2S gas to sulphur, in acidic medium is

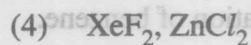
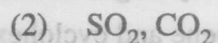
- (1) 80 cm^3 (2) 120 cm^3
 (3) 60 cm^3 (4) 90 cm^3

Space For Rough Work

30. The compound that reacts the fastest with sodium methoxide is



31. The pair of compounds having identical shapes for their molecules is



32. Conductivity of a saturated solution of a sparingly soluble salt AB at 298 K is $1.85 \times 10^{-5} \text{ S m}^{-1}$.
Solubility product of the salt AB at 298 K is

Given $\Lambda_m^\circ(\text{AB}) = 140 \times 10^{-4} \text{ S m}^2 \text{ mol}^{-1}$

(1) 1.32×10^{-12}

(2) 1.74×10^{-12}

(3) 5.7×10^{-12}

(4) 7.5×10^{-12}

33. An incorrect statement with respect to $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ mechanisms for alkyl halide is

(1) Competing reaction for an $\text{S}_{\text{N}}2$ reaction is rearrangement.

(2) A weak nucleophile and a protic solvent increases the rate or favours $\text{S}_{\text{N}}1$ reaction.

(3) A strong nucleophile in an aprotic solvent increases the rate or favours $\text{S}_{\text{N}}2$ reaction.

(4) $\text{S}_{\text{N}}1$ reactions can be catalysed by some Lewis acids.

Space For Rough Work

34. Butylated hydroxy toluene as a food additive acts as
- (1) flavouring agent (2) emulsifier
 (3) antioxidant (4) colouring agent
35. Terylene is NOT a
- (1) polyester fibre (2) step growth polymer
 (3) copolymer (4) chain growth polymer
36. The correct statement is
- (1) One mole each of benzene and hydrogen when reacted gives $1/3$ mole of cyclohexane and $2/3$ mole unreacted hydrogen.
 (2) It is easier to hydrogenate benzene when compared to cyclohexene.
 (3) Cyclohexadiene and cyclohexene cannot be isolated with ease during controlled hydrogenation of benzene.
 (4) Hydrogenation of benzene to cyclohexane is an endothermic process.
37. Among the elements from atomic number 1 to 36, the number of elements which have an unpaired electron in their s subshell is
- (1) 7 (2) 9
 (3) 4 (4) 6
38. The statement that is NOT correct is
- (1) Van der Waals constant 'a' measures extent of intermolecular attractive forces for real gases.
 (2) Boyle point depends on the nature of real gas.
 (3) Compressibility factor measures the deviation of real gas from ideal behaviour.
 (4) Critical temperature is the lowest temperature at which liquefaction of a gas first occurs.

Space For Rough Work

39. The correct arrangement for the ions in the increasing order of their radii is
- (1) $\text{Ca}^{+2}, \text{K}^+, \text{S}^{-2}$ (2) $\text{Cl}^-, \text{F}^-, \text{S}^{-2}$
 (3) $\text{Na}^+, \text{Cl}^-, \text{Ca}^{+2}$ (4) $\text{Na}^+, \text{Al}^{+3}, \text{Be}^{+2}$
40. The correct arrangement of the species in the decreasing order of the bond length between carbon and oxygen in them is
- (1) $\text{CO}_2, \text{HCO}_2^-, \text{CO}, \text{CO}_3^{-2}$ (2) $\text{CO}, \text{CO}_3^{-2}, \text{CO}_2, \text{HCO}_2^-$
 (3) $\text{CO}, \text{CO}_2, \text{HCO}_2^-, \text{CO}_3^{-2}$ (4) $\text{CO}_3^{-2}, \text{HCO}_2^-, \text{CO}_2, \text{CO}$
41. The species that is not hydrolysed in water is
- (1) BaO_2 (2) CaC_2
 (3) P_4O_{10} (4) Mg_3N_2
42. For the properties mentioned, the correct trend for the different species is in
- (1) inert pair effect – $\text{Al} > \text{Ga} > \text{In}$
 (2) first ionization enthalpy – $\text{B} > \text{Al} > \text{Tl}$
 (3) strength as Lewis acid – $\text{BCl}_3 > \text{AlCl}_3 > \text{GaCl}_3$
 (4) oxidising property – $\text{Al}^{+3} > \text{In}^{+3} > \text{Tl}^{+3}$
43. A correct statement is
- (1) $[\text{MnBr}_4]^{-2}$ is tetrahedral.
 (2) $[\text{Ni}(\text{NH}_3)_6]^{+2}$ is an inner orbital complex.
 (3) $[\text{Co}(\text{NH}_3)_6]^{+2}$ is paramagnetic.
 (4) $[\text{CoBr}_2(\text{en})_2]$ exhibits linkage isomerism.

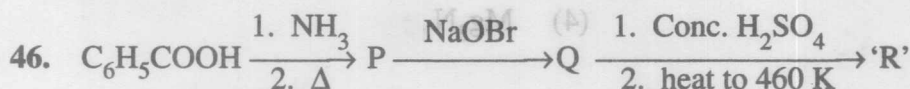
Space For Rough Work

44. Iodoform reaction is answered by all, except

- (1) CH_3CHO (2) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2\text{OH}$
 (3) $\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_2 - \text{COOH}$ (4) $\text{CH}_3 - \text{CH}_2 - \text{OH}$

45. A crystalline solid XY_3 has ccp arrangement for its element Y. X occupies

- (1) 33% of tetrahedral voids (2) 33% of octahedral voids
 (3) 66% of tetrahedral voids (4) 66% of octahedral voids



'R' is

- (1) sulphanilamide (2) p-bromo sulphanilamide
 (3) o-bromo sulphanilic acid (4) sulphanilic acid

47. The statement that is NOT correct is

- (1) Carbohydrates are optically active.
 (2) Lactose has glycosidic linkage between C_4 of glucose and C_1 of galactose unit.
 (3) Aldose or ketose sugars in alkaline medium do not isomerise.
 (4) Penta acetate of glucose does not react with hydroxylamine.

Space For Rough Work

48. Match the reactant in Column – I with the reaction in Column – II :

- | | |
|---|---|
| <p>Column I</p> <p>(i) Acetic acid</p> <p>(ii) Sodium phenate</p> <p>(iii) Methyl cyanide</p> <p>(iv) Toluene</p> | <p>Column II</p> <p>(a) Stephen</p> <p>(b) Friedel-Crafts</p> <p>(c) HVZ</p> <p>(d) Kolbe's</p> |
|---|---|

- (1) i – d, ii – b, iii – c, iv – a (2) i – c, ii – d, iii – a, iv – b
- (3) i – c, ii – a, iii – d, iv – b (4) i – b, ii – c, iii – a, iv – d

49. The statement that is NOT correct is

- (1) In solid state PCl_5 exists as $[PCl_4]^+[PCl_6]^-$
- (2) Phosphorous acid on heating disproportionates to give metaphosphoric acid and phosphine.
- (3) Hypophosphorous acid reduces silver nitrate to silver.
- (4) Pure phosphine is non-inflammable.

50. In which one of the pairs of ion given, there is an ion that forms a co-ordination compound with both aqueous sodium hydroxide and ammonia and an other ion that forms a co-ordination compound only with aqueous sodium hydroxide ?

- | | |
|------------------------|------------------------|
| (1) Zn^{+2}, Al^{+3} | (2) Al^{+3}, Cu^{+2} |
| (3) Pb^{+2}, Cu^{+2} | (4) Cu^{+2}, Zn^{+2} |

51. A crystalline solid X reacts with dil. HCl to liberate a gas Y. Y decolourises acidified $KMnO_4$. When a gas 'Z' is slowly passed into an aqueous solution of Y, colloidal sulphur is obtained. X and Z could be, respectively

- | | |
|----------------------|----------------------|
| (1) Na_2SO_4, H_2S | (2) Na_2SO_4, SO_2 |
| (3) Na_2S, SO_3 | (4) Na_2SO_3, H_2S |

Space For Rough Work

52. An aromatic compound 'A' (C_7H_9N) on reacting with $NaNO_2/HCl$ at $0^\circ C$ forms benzyl alcohol and nitrogen gas. The number of isomers possible for the compound 'A' is
- (1) 7 (2) 6
(3) 5 (4) 3
53. The statement that is NOT correct is
- (1) Collectors enhance the wettability of mineral particles during froth flotation.
(2) Copper from its low grade ores is extracted by hydrometallurgy.
(3) A furnace lined with Haematite is used to convert cast iron to wrought iron.
(4) In vapour phase refining, metal should form a volatile compound.
54. A solution of 1.25 g of 'P' in 50 g of water lowers freezing point by $0.3^\circ C$. Molar mass of 'P' is 94. $K_{f(\text{water})} = 1.86 K \text{ kg mol}^{-1}$. The degree of association of 'P' in water is
- (1) 60% (2) 75%
(3) 80% (4) 65%
55. Volume occupied by single $CsCl$ ion pair in a crystal is $7.014 \times 10^{-23} \text{ cm}^3$. The smallest Cs - Cs internuclear distance is equal to length of the side of the cube corresponding to volume of one $CsCl$ ion pair. The smallest Cs to Cs internuclear distance is nearly
- (1) 4.3 \AA (2) 4.5 \AA
(3) 4.4 \AA (4) 4 \AA
56. For $Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{+3} + 7H_2O$; $E^\circ = 1.33 \text{ V}$ At $[Cr_2O_7^{2-}] = 4.5 \text{ millimole}$, $[Cr^{+3}] = 15 \text{ millimole}$, E is 1.067 V. The pH of the solution is nearly equal to
- (1) 3 (2) 4
(3) 2 (4) 5

Space For Rough Work

57. 1.78 g of an optically active L-amino acid (A) is treated with NaNO_2/HCl at 0°C . 448 cm^3 of nitrogen was at STP is evolved. A sample of protein has 0.25% of this amino acid by mass. The molar mass of the protein is
- (1) $34,500\text{ g mol}^{-1}$ (2) $35,600\text{ g mol}^{-1}$
(3) $36,500\text{ g mol}^{-1}$ (4) $35,400\text{ g mol}^{-1}$
58. 10 g of a mixture of BaO and CaO requires 100 cm^3 of 2.5 M HCl to react completely. The percentage of calcium oxide in the mixture is approximately
(Given : molar mass of BaO = 153)
- (1) 55.1 (2) 47.4
(3) 52.6 (4) 44.9
59. The ratio of heats liberated at 298 K from the combustion of one kg of coke and by burning water gas obtained from kg of coke is
(Assume coke to be 100% carbon.)
(Given enthalpies of combustion of CO_2 , CO and H_2 as 393.5 kJ, 285 kJ, 285 kJ respectively all at 298 K.)
- (1) 0.69 : 1 (2) 0.96 : 1
(3) 0.79 : 1 (4) 0.86 : 1
60. Impure copper containing Fe, Au, Ag as impurities is electrolytically refined. A current of 140 A for 482.5 s decreased the mass of the anode by 22.26 g and increased the mass of cathode by 22.011 g. Percentage of iron in impure copper is
(Given molar mass Fe = 55.5 g mol^{-1} , molar mass Cu = 63.54 g mol^{-1})
- (1) 0.85 (2) 0.90
(3) 0.95 (4) 0.97

Space For Rough Work

SEAL

57. 1.78 g of an optically active L-amino acid (A) is treated with NaNO_2/HCl at 0°C . 448 cm^3 of nitrogen was at STP is evolved. A sample of protein has 0.25% of this amino acid by mass. The molar mass of the protein is

- (1) 34,500 g mol^{-1}
- (2) 32,600 g mol^{-1}
- (3) 36,500 g mol^{-1}
- (4) 32,400 g mol^{-1}

58. 10 g of a mixture of BaO and CaO requires 100 cm^3 of 2.5 M HCl to react completely. The percentage of calcium oxide in the mixture is approximately (Given : molar mass of BaO = 153)

- (1) 52.1
- (2) 47.4
- (3) 52.6
- (4) 44.9

59. The heat liberated at 298 K from the combustion of 10 g of coke and by burning 10 g of coke is (Assume coke to be 100% carbon.)

(Given : enthalpies of combustion of CO_2 , CO and H_2 are -393.5 kJ, -285 kJ and 0 kJ respectively at 298 K.)

- (1) 1 : 1
- (2) 0.96 : 1
- (3) 1 : 0.96
- (4) 0.88 : 1

60. Impure iron containing Fe, Au, Ag as impurities is electrolytically refined. A current of 140 A is passed through the cell for 10 hours. The mass of the anode decreased by 100 g and increased the mass of the cathode by 100 g. Percentage of iron in impure iron is (Given molar mass Fe = 55.8 g mol^{-1} , molar mass Cu = 63.54 g mol^{-1})

- (1) 0.85
- (2) 0.90
- (3) 0.92
- (4) 0.97

Space For Rough Work