

2014

<b>SUBJECT : CHEMISTRY</b>	<b>DAY-2</b>	
<b>SESSION : AFTERNOON</b>	<b>TIME : 02.30 P.M. TO 03.50 P.M.</b>	
<b>MAXIMUM MARKS</b>	<b>TOTAL DURATION</b>	<b>MAXIMUM TIME FOR ANSWERING</b>
<b>60</b>	<b>80 MINUTES</b>	<b>70 MINUTES</b>

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

**DO'S :**

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 2<sup>nd</sup> 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 3<sup>rd</sup> 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 3<sup>rd</sup> 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 :



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.

**C****[Turn Over]****SEAL**

- 1.**  $25 \text{ cm}^3$  of oxalic acid completely neutralised  $0.064 \text{ g}$  of sodium hydroxide. Molarity of the oxalic acid solution is

(1) 0.045

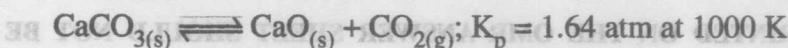
(2) 0.032

MAXIMUM TIME	TOTAL TIME	MAXIMUM MARKS
20 MINUTES	30 MINUTES	30

- 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  $\text{He}^+$  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  $\text{CaCO}_3$  in a 10 litre closed vessel is heated to 1000 K. Percentage of  $\text{CaCO}_3$  that remains unreacted at equilibrium is

(Given  $R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$ )

- (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

Correct Number of squares on the OMR answer sheet is as shown below :



Please note that each square will be recorded by the scanner. Scanable marks must be of such size on the OMR answer sheet as to be recognisable by the scanner. Use the space provided on each page of the despatch pool for Rough Work. To get the best OMR answer sheet for the test, fill in from 3 to 50 bars, not writing on the OMR answer sheet and stick your LEFT HAND thumb impression on the top sheet (On C side), the thumb total will return the bottom sheet before tabbing (Consignee's copy). After tabbing the OMR ANSWER SHEET to the front ineligibility as it is. Hand over the OMR ANSWER SHEET to the self-evaluation. Please give details of the OMR answer sheet for a minimum score of ONE mark to you of each point for self-evaluation.

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

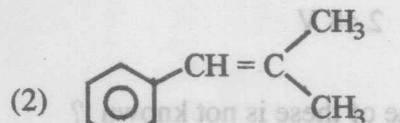
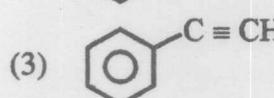
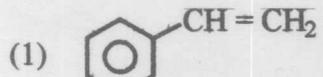
- (a)  $\text{CH}_3\text{COCH}_2\text{COOC}_2\text{H}_5$   
(b)  $\text{CH}_3\text{COCH}_2\text{COCH}_3$   
(c)  $\text{C}_2\text{H}_5\text{OOCCH}_2\text{COOC}_2\text{H}_5$  decreases as  
(1) a > b > c      (2) c > a > b  
(3) a > c > b      (4) b > a > c

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

- (1)  $\text{KO}_2$       (2)  $\text{Na}_2\text{O}_2$   
(3)  $\text{CaO}$       (4)  $\text{Li}_2\text{O}$

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



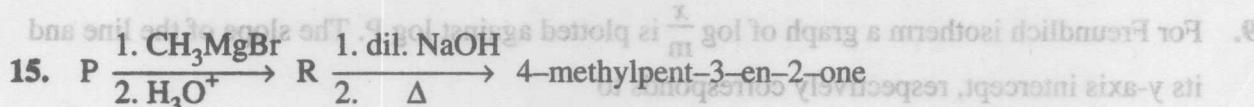
Space For Rough Work

9. Gold Sol is not
- a lyophobic colloid
  - negatively charged colloid
  - a macro molecular colloid
  - a multimolecular colloid
10. Carbocation as an intermediate is likely to be formed in the reaction :
- Acetone + HCN  $\xrightarrow{\text{HO}^-}$  acetonecyanohydrin
  - Hexane  $\xrightarrow{\text{Anhy. AlCl}_3 / \text{HCl}}$  2-methyl pentane
  - Propene + Cl<sub>2</sub>  $\xrightarrow{\text{h}\nu}$  2-chloropropane
  - Ethylbromide + Aq KOH  $\xrightarrow{\Delta}$  ethyl alcohol
11. For an ideal binary liquid mixture
- $\Delta H_{(\text{mix})} = 0$ ;  $\Delta S_{(\text{mix})} < 0$
  - $\Delta S_{(\text{mix})} > 0$ ;  $\Delta G_{(\text{mix})} < 0$
  - $\Delta S_{(\text{mix})} = 0$ ;  $\Delta G_{(\text{mix})} = 0$
  - $\Delta V_{(\text{mix})} = 0$ ;  $\Delta G_{(\text{mix})} > 0$
12. For hydrogen – oxygen fuel cell at one atm and 298 K
- $$\text{H}_{2(g)} + \frac{1}{2}\text{O}_{2(g)} \longrightarrow \text{H}_2\text{O}_{(l)}; \Delta G^\circ = -240 \text{ kJ}$$
- $E^\circ$  for the cell is approximately,
- (Given F = 96,500 C)
- 1.24 V
  - 1.26 V
  - 2.48 V
  - 2.5 V
13. Which one of these is not known ?
- C=Cc1ccccc1
  - C=Cc1ccccc1
  - C=Cc1ccccc1
  - C=Cc1ccccc1

Space For Rough Work

14. The correct statement is

- (1) The extent of actinoid contraction is almost the same as lanthanoid contraction.
- (2)  $\text{Ce}^{+4}$  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  $\text{CH}_2 = \text{CH} - \text{O} - \text{CH}_2 - \text{CH}_3$  reacts with one mole of HI, one of the products formed is

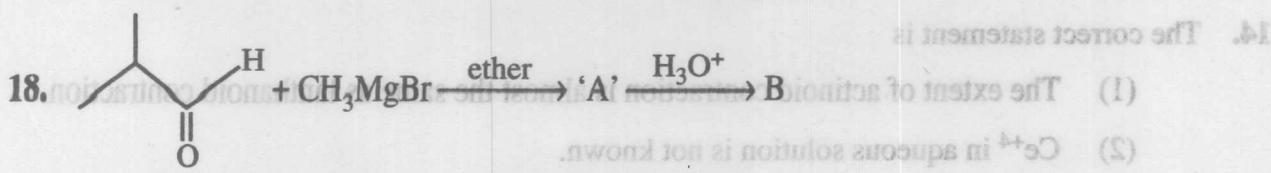
- (1) ethanol
- (2) ethanal
- (3) ethane
- (4) iodoethene

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

- (1)  $(\text{CH}_3)_3\text{C} - \text{CH}_2\text{OH}$
- (2)  $(\text{CH}_3)_2\text{CH} - \text{CH}_2\text{OH}$

- (3)  $\begin{matrix} \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_3 \\ | \\ \text{OH} \end{matrix}$
- (4)  $\begin{matrix} \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \\ | \\ \text{OH} \end{matrix}$

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  $-1 \times 10^4 \text{ K}$ . 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)  $8314 \text{ J mol}^{-1}$
  - (4)  $12.02 \text{ J mol}^{-1}$

21. The IUPAC name of the complex ion formed when gold dissolves in aqua regia 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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Space For Rough Work

26. Acetophenone cannot be brominated easily starting from
23.   
 Y is      (1)  $\text{C}_6\text{H}_5\text{CH}_3$       (2)  $\text{C}_6\text{H}_5\text{CH}(\text{OH})\text{CH}_3$   
 (3)  $\text{C}_6\text{H}_5\text{CH}=\text{CH}_2$       (4)  $\text{C}_6\text{H}_5\text{COOCH}_3$
25. One mole of succinic acid completely dissociates in aqueous solution except for
- (a)  $1\text{M HCl}$  (b)  $1\text{M CH}_3\text{COOH}$  (c)  $1\text{M NaOH}$  (d)  $1\text{M K}_2\text{SO}_4$
- The dissociation order for the pH of the less basic  
(Given  $K_p(\text{NH}_3) = 4.74$ )
- (I)  $s < p < c$       (II)  $p < s < c$       (III)  $c < s < p$       (IV)  $s < c < p$
24.  $\text{A}_{(g)} \xrightarrow{\Delta} \text{P}_{(g)} + \text{Q}_{(g)} + \text{R}_{(g)}$ , follows first order kinetics with a half life of 69.3 s at 500 °C. Starting from the gas 'A' enclosed in a container at 500 °C and at a pressure of 0.4 atm, the total pressure of the system after 230 s will be
- (1) 1.32 atm      (2) 1.12 atm      (3) 1.15 atm      (4) 1.22 atm
25.  $\text{MnO}_2 + \text{HCl} \xrightarrow{\Delta} \text{A}_{(g)}$
- $\text{A}_{(g)} + \text{F}_2(\text{excess}) \xrightarrow{573 \text{ K}} \text{B}_{(g)}$
- $\text{B}_{(l)} + \text{U}_{(s)} \longrightarrow \text{C}_{(g)} + \text{D}_{(g)}$
- The gases A, B, C and D are respectively
- (1)  $\text{Cl}_2, \text{ClF}_3, \text{UF}_6, \text{ClF}$       (2)  $\text{O}_2, \text{O}_2\text{F}_2, \text{U}_2\text{O}_3, \text{OF}_2$   
 (3)  $\text{Cl}_2, \text{ClF}, \text{UF}_6, \text{ClF}_3$       (4)  $\text{O}_2, \text{OF}_2, \text{U}_2\text{O}_3, \text{O}_2\text{F}_2$

Space For Rough Work

26. Acetophenone cannot be prepared easily starting from

- (1)  $C_6H_5CH_3$       (2)  $C_6H_5COCl$  (Y (isotopicologue))  
(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

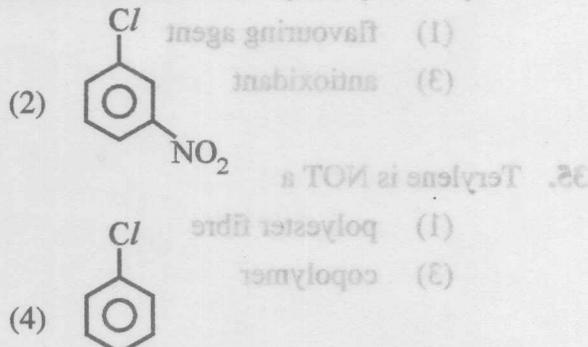
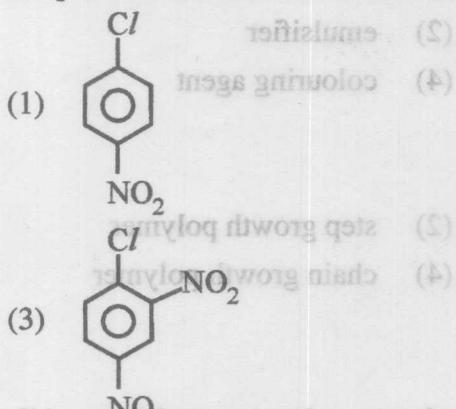
- (1)  $1 \times 10^{-5}$       (2)  $1 \times 10^{-4}$   
(3)  $1 \times 10^{-6}$       (4)  $1 \times 10^{-3}$

29. 50 cm<sup>3</sup> 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

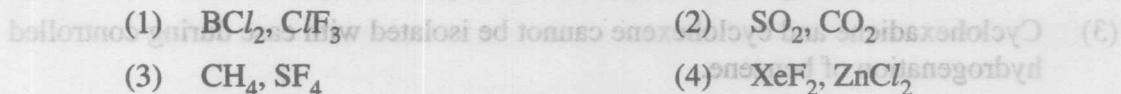
- (1)  $80\text{ cm}^3$       (2)  $120\text{ cm}^3$   
(3)  $60\text{ cm}^3$       (4)  $90\text{ cm}^3$

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

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

- (1)  $1.32 \times 10^{-12}$  (2)  $1.74 \times 10^{-12}$   
 (3)  $5.7 \times 10^{-12}$  (4)  $7.5 \times 10^{-12}$

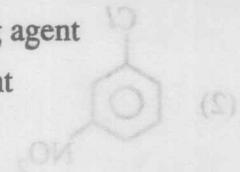
33. An incorrect statement with respect to  $\text{S}_{\text{N}}1$  and  $\text{S}_{\text{N}}2$  mechanisms for alkyl halide is

- (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.

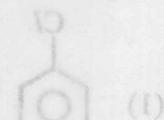
Space For Rough Work

34. Butylated hydroxy toluene as a food additive acts as .06

- (1) flavouring agent
- (3) antioxidant

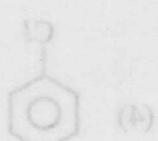


- (2) emulsifier
- (4) colouring agent

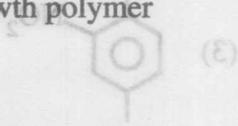


35. Terylene is NOT a

- (1) polyester fibre
- (3) copolymer



- (2) step growth polymer
- (4) chain growth polymer



36. The correct statement is

- (1) One mole each of benzene and hydrogen when reacted gives  $\frac{1}{3}$  mole of cyclohexane and  $\frac{2}{3}$  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)  $\text{Cl}^-, \text{F}^-, \text{S}^{-2}$  (1)  $\text{CH}_3\text{CHO}$   
(3)  $\text{Na}^+, \text{Cl}^-, \text{Ca}^{+2}$  (4)  $\text{Na}^+, \text{Al}^{+3}, \text{Be}^{+2}$  (3)  $\text{CH}_3\text{CH}_2\text{COOH}$

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)  $\text{BaO}_2$  (2)  $\text{CaC}_2$   
(3)  $\text{P}_4\text{O}_{10}$  (4)  $\text{Mg}_3\text{N}_2$

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

38. The correct arrangement for the ions in the bond length between

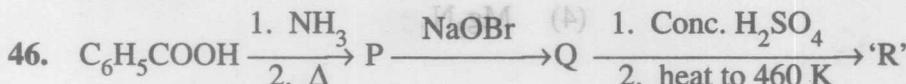
- (1)  $\text{CH}_3\text{CHO}$  (2)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2\text{OH}$   
(3)  $\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_2 - \text{COOH}$  (4)  $\text{CH}_3 - \text{CH}_2 - \underset{\text{OH}}{\text{CH}}$

39. The correct arrangement of the species in the bond length between

- (1)  $\text{Na}^+ \text{Cl}^- \text{Cs}^{+2}$  (2)  $\text{Na}^+ \text{Cl}^- \text{Be}^{2+}$   
(3)  $\text{CO}_2 \text{CO}_2^- \text{CO}_2^{2-}$  (4)  $\text{CO}_2^- \text{CO}_2^- \text{CO}_2^{2-}$

40. The species first is not dissolved in water is

- (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

42. The statement that is NOT correct is

- (1) Carbohydrates are optically active.  
(2) Lactose has glycosidic linkage between  $\text{C}_4$  of glucose and  $\text{C}_1$  of galactose unit.  
(3) Aldose or ketose sugars in alkaline medium do not isomerise.  
(4) Penta acetate of glucose does not react with hydroxylamine.

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### Space For Rough Work

**48.** Match the reactant in Column – I with the reaction in Column – II : 25

- |                      |                    |         |
|----------------------|--------------------|---------|
| (i) Acetic acid      | (a) Stephen        | 1 (I)   |
| (ii) Sodium phenate  | (b) Friedel-Crafts | 2 (II)  |
| (iii) Methyl cyanide | (c) HVZ            | 3 (III) |
| (iv) Toluene         | (d) Kolbe's        | 4 (IV)  |
- (1) i – d, ii – b, iii – c, iv – a      (2) i – c, ii – d, iii – a, iv – b      (I)
- (3) i – c, ii – a, iii – d, iv – b      (4) i – b, ii – c, iii – a, iv – d      (II)
- (5) i – a, ii – b, iii – c, iv – d      (6) i – b, ii – a, iii – d, iv – c      (III)
- (7) i – c, ii – b, iii – a, iv – d      (8) i – a, ii – c, iii – b, iv – d      (IV)

**49.** The statement that is NOT correct is (B)

- (1) In solid state  $\text{PCl}_5$  exists as  $[\text{PCl}_4]^+[\text{PCl}_6]^-$
- (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 ? (A)

- |   |         |   |        |
|---|---------|---|--------|
| (1) $\text{Zn}^{+2}$ , $\text{Al}^{+3}$ | 1 (I)   | (2) $\text{Al}^{+3}$ , $\text{Cu}^{+2}$ | 2 (II) |
| (3) $\text{Pb}^{+2}$ , $\text{Cu}^{+2}$ | 3 (III) | (4) $\text{Cu}^{+2}$ , $\text{Zn}^{+2}$ | 4 (IV) |

**51.** A crystalline solid X reacts with dil.  $\text{HCl}$  to liberate a gas Y. Y decolourises acidified  $\text{KMnO}_4$ . When a gas 'Z' is slowly passed into an aqueous solution of Y, colloidal sulphur is obtained. X and Z could be, respectively (C)

- |   |         |   |        |
|---|---------|---|--------|
| (1) $\text{Na}_2\text{SO}_4$ , $\text{H}_2\text{S}$ | 1 (I)   | (2) $\text{Na}_2\text{SO}_4$ , $\text{SO}_2$        | 2 (II) |
| (3) $\text{Na}_2\text{S}$ , $\text{SO}_3$           | 3 (III) | (4) $\text{Na}_2\text{SO}_3$ , $\text{H}_2\text{S}$ | 4 (IV) |

Space For Rough Work

## Space For Rough Work

- 57.** 1.78 g of an optically active L-amino acid (A) is treated with  $\text{NaNO}_2/\text{HCl}$  at  $0^\circ\text{C}$ .  $448 \text{ cm}^3$  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  $\text{BaO}$  and  $\text{CaO}$  requires  $100 \text{ cm}^3$  of 2.5 M  $\text{HCl}$  to react completely. The percentage of calcium oxide in the mixture is approximately  
 (Given : molar mass of  $\text{BaO} = 153$ )

(1) 55.1      (2) 47.4  
 (3) 52.6      (4) 44.9

**59.** The ratio of heats liberated at  $298 \text{ K}$  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  $\text{CO}_2$ ,  $\text{CO}$  and  $\text{H}_2$  as 393.5 kJ, 285 kJ, 285 kJ respectively all at  $298 \text{ K}$ .)

(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 =  $55.5 \text{ g mol}^{-1}$ , molar mass Cu =  $63.54 \text{ g mol}^{-1}$ )

(1) 0.85      (2) 0.90  
 (3) 0.95      (4) 0.97

## **Space For Rough Work**

178 g of an optically active L-salicylic acid (A) is treated with  $\text{NaNO}_2\text{HCl}$  at  $0^\circ\text{C}$ . At  $25^\circ\text{C}$ , 178 g of nitrogen was at STP is evolved. A sample of protein has 0.52% of this amino acid by mass. The molar mass of this protein is

- (1) 34200 g mol<sup>-1</sup>  
(2) 32400 g mol<sup>-1</sup>  
(3) 36200 g mol<sup>-1</sup>  
(4) 35400 g mol<sup>-1</sup>

10 g of a mixture of BaO and CaO requires 100 cm<sup>3</sup> of 2.5 M HCl to react completely. The percentage of calcium oxide in the mixture is approximately

$$(\text{Given : molar mass of BaO} = 123)$$

- (1) 22.1  
(2) 22.0  
(3) 47.4  
(4) 44.0

The number of molecules present at 298 K from the combustion of one g of coke and by burning of one g of coal is

$$(\text{Given : molar mass of 100g coupon} = 1282 \text{ g})$$

(Given : molar mass of CO<sub>2</sub>, CO and H<sub>2</sub> are 44, 28 and 2.0 g mol<sup>-1</sup> respectively at 298 K)

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

Impure iron containing 2% Ag as impurities is melted in a crucible. A current of 100 A is passed through it to melt the iron in its pure form. It is observed that a definite percentage of iron is lost due to oxidation of Ag. A current of

$$(\text{Given : molar mass Fe} = 56.2 \text{ g mol}^{-1}, \text{molar mass Cu} = 63.54 \text{ g mol}^{-1})$$

- (1) 0.28  
(2) 0.30  
(3) 0.26  
(4) 0.24

Space for Reading Marks