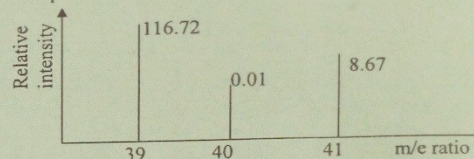


Questions 1 - 30 (Thirty questions).

Directions: Each of the questions or incomplete statements in this section is followed by four suggested answers. Select the best answer in each case.

- Which indicator is suitable for standardizing a potassium permanganate solution using ammonium iron (II) sulphate?
A phenolphthalein
B Starch solution
C Methyl orange
D No indicator
- Select the molecule which has a dative covalent bond.
A NH_3
B PCl_3
C N_2
D CO
- Which of the following sulphates is the most soluble?
A MgSO_4
B CaSO_4
C SrSO_4
D BaSO_4
- When ethanol, $\text{CH}_3\text{CH}_2\text{OH}$, is warmed with aqueous acidified dichromate, $\text{H}^+/\text{Cr}_2\text{O}_7^{2-}$, the colour of the solution changes from
A Orange to green
B Purple to green
C Yellow to green
D Blue to green
- In a titration reaction, 19.4 cm^3 of sodium hydroxide, NaOH neutralized 25 cm^3 of 0.05 mol dm^{-3} ethanedioic (oxalic) $\text{H}_2\text{C}_2\text{O}_4$ acid. Calculate the concentration of the sodium hydroxide solution.
A 0.05 mol dm^{-3}
B 0.13 mol dm^{-3}
C 0.06 mol dm^{-3}
D 0.12 mol dm^{-3}
- Select the compound that has the lowest boiling point.
A $\text{CH}_3(\text{CH}_2)_3\text{CH}_2\text{OH}$
B $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{OH}$
C $(\text{CH}_3)_2\text{CHCH}_2\text{CH}_2\text{OH}$
D $(\text{CH}_3)_3\text{CCH}_2\text{OH}$

7. The mass spectrum of a vaporized sample of potassium is given below. Use the information on the spectrum to calculate the relative atomic mass of potassium.



- A 40.0
B 41.8
C 39.1
D 125.4
- Calculate the pH of a buffer solution that is made by mixing equal volumes of 0.1 mol dm^{-3} sodium benzoate and 0.04 mol dm^{-3} benzoic acid. (K_a of benzoic acid = $6.4 \times 10^{-5} \text{ mol dm}^{-3}$)
A 4.59
B 3.79
C 8.38
D 1.67
 - Which of the following carboxylic acid derivatives is likely to be least reactive with respect to acid hydrolysis?
A Ethanamide CH_3CONH_2
B Ethanoyl chloride CH_3COCl
C Ethyl ethanoate $\text{CH}_3\text{COOCH}_2\text{CH}_3$
D Ethanoyl anhydride $(\text{CH}_3\text{CO})_2\text{O}$
 - The coordination number of the transition metal in the complex ion $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$ is,
A 3
B 4
C 2
D 6
 - Predict which of the following compounds will undergo a nucleophilic addition reaction.
A $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_3$
B $\text{CH}_2\text{CH}=\text{CH}_2$
C $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$
D $\text{CH}_3\text{CH}_2\text{CHO}$
 - Hexane and heptane form an ideal solution. The vapour pressures of pure hexane and heptane at 25°C are 19 kPa and 36 kPa respectively. Calculate the total vapour pressure of the solution that contains 0.978 mole of hexane and 0.364 mole of heptane. The 0.364 mole of heptane.
A 13.85 kPa
B 9.76 kPa
C 23.61 kPa
D 33.37 kPa

3

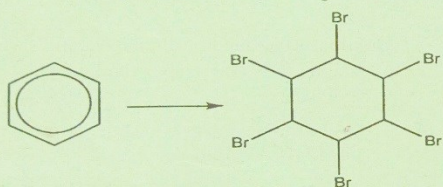
13. In which of the following complex ions is the ligand bidentate?

A $[\text{Cu EDTA}]^{2-}$
 B $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$
 C $[\text{Fe}(\text{CN})_6]^{3-}$
 D $[\text{NiCl}_4]^{2-}$

14. Calculate the enthalpy of formation of ethyne, CHCH , given that the enthalpies of combustion of carbon, hydrogen and ethyne (in kJ mol^{-1}) are -394, -286 and -1300 respectively.

A +226
 B +620
 C -1980
 D -2374

15. Select the most suitable reagent and reaction conditions for the following conversion.



A Br_2 , U V light
 B Br_2 , AlCl_3
 C Br_2 , FeBr_3
 D Br_2 , CCl_4

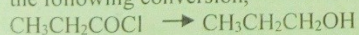
16. Iodine-131 has a half-life of 8.1 days. How much of 2 g of the isotope will remain after 56.7 days?

A 0.016 g
 B 0.063 g
 C 0.031 g
 D 0.125 g

17. Which of the following pairs of oxides will react with both dilute acid and alkali to form salts?

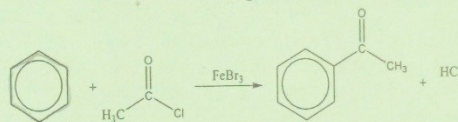
A GeO , PbO_2
 B CO , SiO_2
 C SnO , CO_2
 D SnO_2 , SiO

18. Give the reagents and reaction conditions for the following conversion,



A LiAlH_4 /dry ether
 B H_2 /Pd, BaSO_4
 C $\text{H}^+/\text{K}_2\text{Cr}_2\text{O}_7$
 D $\text{Sn}/\text{Conc HCl}$

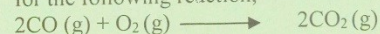
19. From the following reaction scheme,



When 4 g of ethanoyl chloride was used, 3.24 g of phenylethanone was obtained. Calculate the percentage yield of the reaction. (C = 12; H = 1; O = 16)

A 65.40%
 B 81.00%
 C 53.03%
 D 6.11%

20. Given the following bond energies in KJmol^{-1} : $\text{C} \equiv \text{O}$ 1077; $\text{O} = \text{O}$ 498.3; $\text{C} = \text{O}$ 805, calculate the energy change (in kJ mol^{-1}) for the following reaction,



A +1847.3
 B -1042.3
 C -567.7
 D +1042.3

21. Which of the following best describes the shape of the sulphite ion, SO_3^{2-} ?

A Trigonal planar
 B Trigonal pyramidal
 C Tetrahedral
 D Trigonal bipyramidal

22. In which of the following locations in the Periodic Table is the element that has the following electronic configuration, $1s^2 2s^2 2p^6 3s^2 3p^5$ most likely to be found?

A Period 3, Group 5
 B Period 3, Group 7
 C Period 7, Group 3
 D Period 2, Group 7

23. A white crystalline solid reacts with dilute hydrochloric acid to give a pale yellow precipitate and a colourless gas that decolourises aqueous bromine. The solid is most likely to be

A Sodium carbonate
 B Sodium sulphide
 C Sodium thiosulphate
 D Sodium sulphite

24. Which of the following reagents are the most suitable to distinguish between ethanal CH_3CHO and propanal $\text{CH}_3\text{CH}_2\text{CHO}$?

A Ammoniacal AgNO_3
 B 2,4-dinitrophenylhydrazine (2,4-DNPH)
 C PCl_5
 D I_2/NaOH

Turn Over

25. When $^{210}_{82}\text{Pb}$ undergoes two successive beta decays the nuclide produced will be,
 A $^{210}_{84}\text{Po}$
 B $^{210}_{83}\text{Bi}$
 C $^{210}_{81}\text{Tl}$
 D $^{210}_{82}\text{Pb}$
26. Calculate the pH of the solution that results when 40 cm^3 of 0.05 mol dm^{-3} hydrochloric acid solution is added to 10 cm^3 of 0.10 mol dm^{-3} sodium hydroxide solution.
 A 1.7
 B 1.2
 C 3.0
 D 2.7
27. Which of the following pairs of liquids, on mixing will form a solution that will deviate negatively from Raoult's law?
 A Propan-2-ol and Propan-1-ol
 B Ethanol and water
 C Propanone and trichloromethane
 D Methanol and water
28. Select the most suitable set of reagents that can be used in reducing ethanamide CH_3CONH_2 to methylamine, CH_3NH_2 .
 A Br_2/NaOH
 B $\text{LiAlH}_4/\text{dry ether}$
 C Sn/HCl
 D ZnCl_2/HCl
29. Which of the following oxoacids of chlorine contains chlorine in the +5 oxidation state?
 A HClO_4
 B HClO_2
 C HClO_3
 D HClO
30. Which intermolecular force is responsible for the dimerization of ethanoic (acetic) acid in liquid benzene?
 A Van der Waals forces
 B Dipole-dipole attractions
 C Hydrogen bonding
 D Permanent dipole-dipole attraction

Questions 31 - 44 (Fourteen questions)

Directions: For each of the questions below, ONE or MORE of the responses is (are) correct. Decide which of the responses is (are) correct. Then choose:

- A 1, 2 and 3 are all correct
 B 1 and 2 only are correct
 C 2 and 3 only are correct
 D 3 only is correct

Directions Summarised			
A	B	C	D
1,2,3, correct	1,2, only	2,3 only	3 only

31. Which of the statements below is (are) true, for a cell composed of the following half cells
 $\text{Ag}^+(\text{aq}) + \text{e}^- \rightarrow \text{Ag}(\text{s}) \quad E^\circ = +0.80\text{ V}$
 $\text{Cu}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Cu}(\text{s}) \quad E^\circ = +0.34\text{ V}$
 1 The salt bridge must contain saturated KCl solution
 2 The standard emf of the cell, $\text{Cu}(\text{s})|\text{Cu}^{2+}(\text{aq})||\text{Ag}^+(\text{aq})|\text{Ag}(\text{s})$ is $+0.46\text{ V}$
 3 $\text{Cu}(\text{s})$ is the reducing agent
 A
 B
 C
 D
32. The product(s) obtained from the ozonolysis of the alkene, $(\text{CH}_3)_2\text{C}=\text{CH}_2$ is (are),
 1 HCHO
 2 CH_3COCH_3
 3 CH_3CHO
 A
 B
 C
 D
33. Identify the conjugate acids in the following acids-base equilibrium
 $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightleftharpoons [\text{Fe}(\text{H}_2\text{O})_5]^{2+}(\text{aq}) + \text{H}_3\text{O}^+(\text{aq})$
 1 $\text{H}_3\text{O}^+(\text{aq})$
 2 $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}(\text{aq})$
 3 $\text{H}_2\text{O}(\text{l})$
 A
 B
 C
 D
34. A compound with the formula $\text{C}_4\text{H}_{10}\text{O}$, can exhibit which of the following types of isomerism?
 1 Position isomerism
 2 Functional group isomerism
 3 Chain isomerism
 A
 B
 C
 D

35. It can be deduced from the rate equation of the reaction,
 $\text{CH}_3\text{COCH}_3 + \text{I}_2 \rightarrow \text{CH}_3\text{COCH}_2\text{I} + \text{H}^+ + \text{I}^-$
 given by rate = $K[\text{CH}_3\text{COCH}_3][\text{H}^+]$, that the reaction is
 1 Second order
 2 Zero order with respect to I_2 .
 3 Unimolecular
 A
 B
 C
 D
36. True statements on 2-aminopropanoic acid, $\text{CH}_3\text{CH}(\text{NH}_2)\text{COOH}$, are : it is
 1 Optically active
 2 Capable of forming a zwitterion in a neutral solution
 3 An amino acid
 A
 B
 C
 D
37. Which of the following compounds is likely to form a white precipitate on reaction with aqueous bromine?
 1 Phenol
 2 Phenylamine
 3 Ethanol
 A
 B
 C
 D
38. Which of the following statements is (are) true about lithium, a Group I element of the Periodic Table?
 1 Its ionic salts give a deep red flame colour
 2 It shows a diagonal relationship with magnesium
 3 Its nitrates decompose into nitrites and oxygen
 A
 B
 C
 D
39. Which of the following pairs of liquids, on mixing will form a solution that will deviate positively from Raoult's law?
 1 Nitric acid and water
 2 Propanone and trichloromethane
 3 Ethanol and water
 A
 B
 C
 D
40. Which of the following factors will affect the value of the equilibrium constant, K_c for the exothermic reaction,
 $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$
 1 Change in pressure
 2 Change in concentration
 3 Change in temperature
 A
 B
 C
 D
41. Which of the following statements are true of the chemistry of Group IV elements of the Periodic Table as the group is descended?
 1 The elements change from non-metals to metals
 2 The stability of the dioxides decrease
 3 The stability of the tetrachlorides increase
 A
 B
 C
 D
42. Some species which have five unpaired electrons in the 3d subshell include
 1 A manganese atom
 2 An Fe^{3+} ion
 3 A chromium atom
 A
 B
 C
 D
43. From which monomers can the polyester Terylene be produced?
 1 Ethane-1,2-diol
 2 Terephthalic acid (benzene 1,4-dicarboxylic acid)
 3 Ethanedioic acid
 A
 B
 C
 D
44. The rate equation of the reaction,
 $\text{CH}_3\text{COCH}_3 + \text{I}_2 \rightarrow \text{CH}_3\text{COCH}_2\text{I} + \text{H}^+ + \text{I}^-$
 can be determined by
 1 Titration method
 2 Colorimetry
 3 Pressure change method
 A
 B
 C
 D

Questions 45 - 50 (Six questions)

Directions: Each of the following questions consists of a statement in the left-hand column followed by a second statement in the right-hand column. Decide whether the first statement is true or false. Decide whether the second statement is true or false. Then choose:

- A If both statements are true and the second statement is a CORRECT explanation of the first statement.
 B If both statements are true and the second statement is NOT a CORRECT explanation of the first statement.
 C If the first statement is true, but the second statement is false.
 D If the first statement is false, but the second statement is true.

Summary of Directions			
	First Statement	Second Statement	
A	True	True	Second statement is a CORRECT explanation of the first
B	True	True	Second statement is NOT a CORRECT explanation of the first
C	True	False	
D	False	True	

FIRST STATEMENT

SECOND STATEMENT

- | | | |
|-----|--|---|
| 45. | An aqueous solution of hydrochloric acid shows a negative deviation from Raoult's | When concentrated HCl is mixed with water, heat is evolved |
| 46. | An aqueous solution of sodium ethanoate is alkaline having a pH value greater than 7 | Sodium ethanoate is the salt of a weak base and strong acid. |
| 47. | Zinc oxide is amphoteric. | When heated zinc oxide turns from a white solid to a yellow solid. |
| 48. | Carbon tetrachloride reacts with water. | Carbon lacks available low lying d-orbitals. |
| 49. | When ammonium nitrate is dissolved in water, the temperature of the solution drops. | The lattice energy of ammonium nitrate is greater than the total solvation energy of its ions |
| 50. | Ethyne gives a white precipitate when reacted with ammoniacal silver nitrate. | Ethyne is converted to benzene when strongly heated. |

STOP

NOW GO BACK AND CHECK YOUR WORK