



THE CRANES EXAMINATIONS BOARD

"EVER FORWARD"

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S.6 TEST TWO: 2025

P525/1 CHEMISTRY

PAPER 1

TIME: 2 ¾ hours

NAME:..... SIGNATURE:.....

Instructions to candidates

- *Attempt all questions in section A and any six questions from section B.*
- *All questions are to be answered in the spaces provided.*
- *A periodic table with relevant atomic masses will be provided.*
- *Mathematical tables (3 figures) on non – programmable silent scientific calculators may be used.*

For internal examiner's use only

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

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SECTION A(46 MARKS)

1. (a) Explain why an azeotrope is a mixture and not a compound. (02 marks)

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- (b) Name three methods for separating azeotropic mixtures. (01 ½ marks)

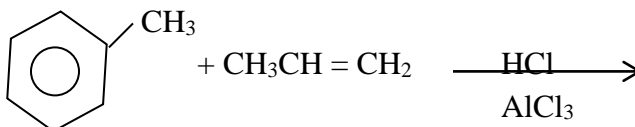
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- (c) Naphthalene (C₁₀H₈) distills in steam at 98.3°C under a pressure of 753mmHg. The vapour pressure of water at this temperature is 715mmHg . Calculate the percentage by mass of Naphthalene in the distillate. (01 ½ marks)

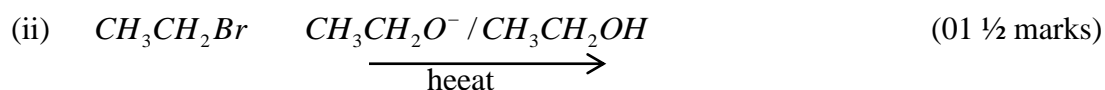
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2. (a) Complete the following equations and name the major product. (01 ½ marks)

(i)



Name of product :



Name of product

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(b) Write the mechanism for the reaction in a(i) (02 marks)

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3. What is an ideal solution? (01 marks)

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(b) A mixture of ethanol and methyl benzene deviates positively.

(i) Explain what causes positive deviation. (01 ½ marks)

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(ii) Draw temperature composition diagram for this mixture and label the parts fully.

(01 ½ marks)

(c) At 744mmHg the steam distillation of a certain liquid takes place at 96°C. The vapour pressure of water at that temperature is 634mmHg and the distillate contains 55% by weight of the liquid. Calculate the molecular weight of the liquid.

(02 marks)

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4. (a) State what was observed and write equation of reaction when aqueous sodium hydroxide was added to;

i) Aqueous a magnesium sulphate

Observation.

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Equation

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ii) Aqueous aluminium sulphate

Observation

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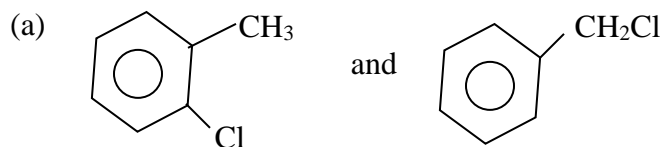
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Equation.

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5. Name the reagent(s) that can be used to distinguish between the following compounds in each case state what observed when each of compounds is separately treated with the reagent (05marks)



Reagents

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Observation(s)

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(b) Propan-2-ol ad Propan-1-ol

Reagent

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Observations

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6. (a) 0.72g of a compound M was dissolved in 80.0g of water and the resulting solution had a freezing point of -0.14°C . When 2.9g of the same compound was dissolved in 111g of benzene the freezing point was depressed by 0.6°C . Calculate the apparent molecular mass of M in

(i) Water

$[\text{K}_f \text{ for water} = 1.90^{\circ}\text{C mol}^{-1} \text{ kg}^{-1}]$

(02 ½ marks)

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(ii) Benzene

$[\text{K}_f \text{ for benzene} = 5.5^{\circ}\text{C mol}^{-1} \text{ Kg}^{-1}]$

(01½ marks)

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(b) Explain why the molecular mass of M differs in the two solvents. (01 marks)

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7. 20cm^3 of a gaseous hydrocarbon (Y) burns with soot when exploded in 200cm^3 of oxygen in excess to give a residue gas of volume of 160cm^3 on cooling to room temperature. On addition of concentrated potassium hydroxide to the residual gas the volume reduced to 20cm^3 .

(a) Calculate the molecular formula of Y (02 marks)

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(b) Suggest the structure of Y and give its IUPAC name (01 mark)

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(c) Write equations to show how Y can be converted to phenylethanol. (02marks)

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8. (a) State Raoult's law of relative lowering of vapour pressure. (01 ½ marks)

(b) (i) Calculate the vapour pressure of a solution containing 18g of glucose ($C_6H_{12}O_6$) in 50g of water at $60^\circ C$. [Vapour pressure of water at $60^\circ C$ is 150mmHg] (02½ marks)

(ii) State any assumptions made in b (i) (01 marks)

9. (a) State four properties in which lithium resembles magnesium. (02 marks)

(b) Write equation(s) for the reaction of the carbides of beryllium and aluminium with water. (3 marks)

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SECTION B:(56 MARKS)
Attempt only six questions from this section

10. Bauxite is the principal ore used for the extraction of aluminium.

(a) (i) Write the formula of Bauxite. (½ mark)

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(ii) Name two impurities present in Bauxite (1 mark)

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(b) Briefly describe how pure aluminium can be obtained from bauxite.
(include appropriate equations where necessary) (5 marks)

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c) Sodium carbonate solution was added to an aqueous solution of aluminium chloride.

(i) State what was observed. (1 mark)

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(ii) Write equation of reaction that took place. (1 ½ marks)

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11. (a) State three reasons why carbon differs in some of its properties from the rest of group (IV) elements. (3 marks)

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- (b) Write equations for the reaction of lead (IV) oxide with;

(i) aqueous sodium hydroxide (1 ½ marks)

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(ii) ice cold concentrated hydrochloric acid (1 ½ marks)

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- (c) Explain why carbondioxide is a gas at room temperature while silicon (IV) oxide exists as a solid at room temperature. (3 marks)

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12. (a) A compound Z contained 19.1% nitrogen, 43.6% oxygen and rest being manganese.

(i) Calculate the empirical formula of Z (01 ½ marks)

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- (iii) 10g of Z in 1000g of water lowered the freezing point by 0.127°C.
Calculate the molecular formula of Z (K_f for water is $1.86^\circ\text{C mol}^{-1} \text{ Kg}^{-1}$)

(02 ½ marks)

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- (b) When Z was strongly heated brown fumes were given off.
Z dissolved in water to form a pink solution which decolourises acidified
potassium manganate (VII) (01 marks)
Identify Z

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- (c) State what would be observed and write equation(s) for the reaction(s) that took
place in the solution in (b) when
(i) concentrated nitric acid and lead (IV) oxide was added and the mixture boiled
(02 marks)

Observation

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Equation

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- (ii) Sodium carbonate solution was added (02 marks)

Observation

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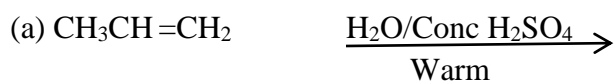
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Equation

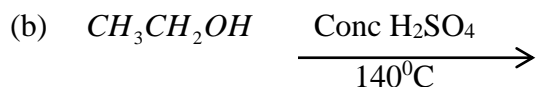
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13. Complete the following equations and in each case write the accepted mechanism of reaction (3 marks each)



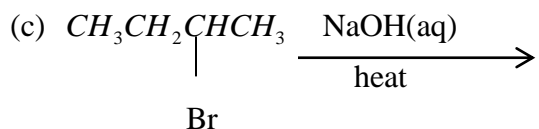
Mechanism

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Mechanism

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Mechanism

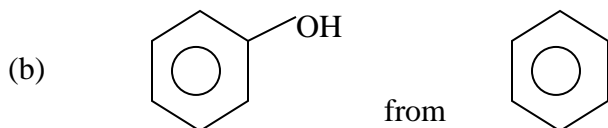
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14. Show how the following conversion can be effected. [in each case indicate the reagents and conditions of reaction] (3 marks each)

(a) propan-2-ol to propan-1-ol

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(c) CH_3COCH_3 from $\text{CH}_3\text{CH}_2\text{OH}$

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15. 3.70g of an organic compound Q containing carbon, hydrogen and oxygen was exploded with excess oxygen. 4.50g of water and 6.48dm³ of gaseous substances were passed through sodium hydroxide solution, 2.0dm³ of oxygen was found unreacted (All volumes of gaseous substances were measured at s.t.p)

(b) (i) Determine the empirical formula of Q. (3mks)

ii) If vapour density of Q is 37, determine the molecular formula of Q and write all the possible structural formulae of Q. (3 ½ mks)

(c) Q reacts with a mixture of sodium hydroxide and iodine solution to give a yellow precipitate.

(i)

(i) Identify Q (0 ½ mark)

ii) Name the reagents used to confirm the functional group in Q. (½ mk)

iii) Starting from but – 1 – yne ($\text{CH}_3\text{CH}_2\text{C}\equiv\text{CH}$) and using equations, outline one method by which Q could be prepared. (01 ½ marks)

THE PERIODIC TABLE

1	2											3	4	5	6	7	8
1 H 1.0																1 H 1.0	2 He 4.0
3 Li 6.9	4 Be 9.0											5 B 10.8	6 C 12.0	7 N 14.0	8 O 16.0	9 F 19.0	10 Ne 20.2
11 Na 23.0	12 Mg 24.3											13 Al 27.0	14 Si 28.1	15 P 31.0	16 S 32.1	17 Cl 35.4	18 Ar 40.0
19 K 39.1	20 Ca 40.1	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.7	29 Cu 63.5	30 Zn 65.7	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc 98.9	44 Ru 101	45 Rh 103	46 Pd 106	47 Ag 103	48 Cd 112	49 In 115	50 Sn 119	51 Sb 122	52 Te 128	53 I 127	54 Xe 131
55 Cs 133	56 Ba 137	57 La 139	72 Hf 178	73 Ta 181	74 W 184	75 Re 186	76 Os 190	77 Ir 192	78 Pt 195	79 Au 197	80 Hg 201	81 Tl 204	82 Pb 207	83 Bi 209	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89 Ac (227)															
			57 La 139	58 Ce 140	59 Pr 141	60 Nd 144	61 Pm (145)	62 Sm 152	63 Sm 150	64 Eu 152	65 Tb 159	66 Dy 162	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173	71 Lu 175
			89 Ac (227)	90 Th 232	91 Pa 231	92 U 238	93 Np 237	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf 251	99 Es (254)	100 Fm (257)	101 Mv (256)	102 No (254)	103 Lw

END