Question	Part	Answer	Notes	Marks	Edexcel IGCSE Chemistry Paper 2 2025
1	a	B - Gold		1	
	b	A - Group 1, Period 2		1	
	c	27.8/7 = 3.97; 64.1/32 = 2.00; 127.8/16 = 7.98	*Find moles of each element using moles = mass/A_r*	3	
		3.97/2 ≈ 2; 2/2 = 1; 7.98/2 ≈ 4			
		So formula = Li_2SO_4			
	d	For Li^+ perform a flame test	*Credit description of flame test*	5	
		Sample into blue bunsen flame			
		Flame should turn red	*Accept crimson red*		
		Add barium chloride to solution	*Credit add HCl first*		
		White precipitate of barium sulphate formed			
		Confirming SO_4^{2-}			
2	a	Neutralisation		1	
	b	Changes from yellow to orange/red	*Allow 'yellow to red' but not 'red to yellow'*	1	
	c	Methyl orange gives sharp, distinct colour change	*Credit idea that is easier to tell colour with methyl orange*	1	
		Or methyl orange is more sensitive/accurate than UI	*Credit other reasonable answers*		
	d	3.9 cm^3		3	
		27.4 cm^3			
		27.4 - 3.9 = 23.5 cm^3			
	e	Sulphuric acid dissolves in water	*Credit 'dissociates/ionises' in water*	2	
		To from H^+ and SO_4^{2-} ions	*Both needed for the mark*		
	f	Moles of NaOH = 0.200 * (25/1000) = 0.005 mol		3	
		Moles of H_2SO_4 = 0.005/2 = 0.0025 mol	*Because a 2:1 ratio of NaOH to H_2SO_4*		
		0.0025/0.0235 = 0.106 mol/dm^3	*Vol = 23.5 cm^3/1000 = 0.0235 dm^3*		
	g	0.0106 * 2 = 0.212	*Because $2H^+$ for every mole of H_2SO_4*	1	
			If using 0.25 mol/dm^3 then answer = 0.5		

3	a	Colorimiter is used to measure the concentration of chlorine gas	*As chlorine gas is green in colour*	2	
		So can be used to measure the position of equilibrium	*Credit if equilibrium is on left or right*		
		Or idea that colorimeter gives a quantitative/objective measure			
	b	Reaction is reversible	*Credit idea that reaction never goes to completion*	2	
		Some PCl_5 still remains in system	*Credit idea of dynamic equilibrium*		
		Or idea that PCl_5 dilutes green colour			
	c	At higher pressure, green colour intensity is lower		3	
		Because increasing pressure favours side with fewer number of gas molecules	*Credit converse*		
		So equilibrium shifts to the left, decreasing the concentration of chlorine gas	*Which reduces the green light intensity*		
	d	At higher temperatures, intensity of green colour increases		2	
		Meaning more chlorine is produced			
		So equilibrium shifts to the right	*Which is the case for endothermic reaction when temp. increases*		
	e	5 * 326 = 1630	*These are the 5* P-Cl bonds broken*	3	
		(3 * 326) + (1* 242) = 1220	*These are the 3* P-Cl bonds and 1* Cl-Cl bond formed*		
		1630 - 1220 = +410 kJ/mol			

4	a	Hydroxyl or OH group		1	
	b	$12n + (2n + 2) = 86$	*Credit idea that general formula for alkanes = C_nH_{2n+2}*	2	
		$14n = 84$ so $n = 6$			
		Therefore formula = C_6H_{14}			
	c	Alkanes are highly flammable and burn easily in oxygen	*Credit idea that alcohols are not as flammable*	2	
		Alkanes release lots of energy per gram or per mole	*Or idea that alcohols participate in incomplete combustion*		
	d	First method = alcoholic fermentation		5	
		Glucose from plants combined with yeast	*Credit sugar*		
		At around 30-40°C in anaerobic conditions			
		Renewable and carbon neutral			
		Produces impure ethanol that needs distillation			
		$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2\ CO_2$			
		Second method = hydration of ethene gas			
		Ethene from crude oil/fossil fuels	*Credit ethene as a product of cracking*		
		At 300°C, high pressure and acid catalyst			
		Produces pure ethanol with no extra purification needed			
		$C_2H_4 + H_2O \rightarrow C_2H_5OH$	*Full marks requires at least 3 valid comparison points*		
	e	Four C atoms in chain with COOH group at the end	*See structure here*	1	
	f	Ethyl butanoate		1	
	g	Fruity smell	*Credit 'sweet smelling'*	1	
5	a	Points correctly plotted within half-square	*Temperature on x-axis and Mass of Carbonate Dissolved on y-axis*	1	
	b	Result at 50°C circled	*This value is too high*	1	
	c	Smooth continuous curve	*Do not credit if value at 50°C is included*	1	
	d	Student may have incorrectly weighed ammonium carbonate	*They may have added too much to the solvent*	2	
		Solution may not have been fully dissolved before measuring	*Leaving undissolved solvent*		
		Student may have read the thermometer incorrectly			
	e	Extended best fit curve to 80°C		2	
		Draw line at 80°C up to the curve then along to y-axis	*Typical answer would be around 150 g in 30 cm^3 of water*		
	f	Read mass of ammonium carbonate at 25°C	*This is approx. 40 g in 30 cm^3 of water*	2	
		(40/30) * 100 = 133.3 g/100 g of water	*Credit 1 mark if value is sig. different but same method*		
	g	One lone pair of electrons on N	*Either 2 crosses or 2 dots*	2	
		3 bonding pairs between N and H	*1 cross and 1 dot for each electron - see diagram here*		

6	a	Aqueous NaCl contains free moving Na^+ and Cl^-	*Credit idea that ions are free to move*	2	
		These ions can carry charge	*Allowing electricity to flow through the solution*		
	b	At anode Cl^- ions lose electrons to form Cl_2 gas	*Credit positive electrode*	4	
		So are oxidised			
		$2Cl^- \rightarrow Cl_2 + 2e^-$			
		At cathode water molecules gain electrons to form H_2 gas	*Credit negative electrode*		
		So are reduced			
		$2H_2O + 2e^- \rightarrow H_2 + 2OH^-$			
		Or $2H^+ + 2e^- \rightarrow H_2$	*Half-equations needed for full marks*		
	c	In aqueous NaCl, sodium ions are more reactive than hydrogen ions	*So hydrogen gas is produced instead of sodium metal*	2	
		So use molten NaCl instead	*As only Na^+ and Cl^- ions are present*		
	d	0.5 * (40/1000) = 0.02 moles per min	*n = c * v/1000*	4	
		0.02 * 60 = 1.2 moles of NaOH per hour			
		For every 2 moles of NaOH, 1 mole of Cl_2 and 1 mole of H_2 produced	*This is from the balanced equation*		
		0.6 + 0.6 = 1.2 moles of gas			
		1.2 * 24 = 28.8 dm^3 per hour			