

Question number		Answer	Notes	Marks	
1	a	organic compounds flammable OR decreases chance of fire OR less vapour/gas escapes	Ignore references to breaking boiling tube / beaker/escape of mercury / need to hold boiling tube / being burned by flame / loss of heat Ignore liquid escapes Accept stops/prevents vapour escaping Reject references to reactions inside the beaker	1	
1	b	i	M1 M2 all five points correct	to nearest gridline Deduct 1 mark for each error If points not visible, assume they are under the line	2
			M3 straight line of best fit	Must be drawn with a ruler Does not need to be extrapolated Line should go through any two correctly plotted points	1
		ii	correct qualitative relationship	eg boiling point increases as relative formula mass increases / positive correlation Accept statement "wrong" way round Reject mass in place of relative formula mass Reject temperature in place of boiling point Reject (directly) proportional	1
		iii	117 (°C) ±1°	CQ on candidate graph	1
		iv	E		1
				<b>Total</b>	<b>7</b>

Question number	Answer	Accept	Reject	Marks
2 (a)	<p><b>Any two from:</b></p> <p><b>M1</b> both forward and backwards reactions are occurring</p> <p><b>M2</b> amounts/concentrations of reactants and products stay the same/pressure (of gas mixture) stays the same</p> <p><b>M3</b> rate of forward reaction = rate of backwards reaction</p>	masses for amounts	are the same	2
(b) (i)	<p><b>M1</b> increase</p> <p><b>M2</b> (forward) reaction is exothermic/gives out heat</p> <p><b>M2</b> dep on <b>M1</b></p> <p><b>IGNORE</b> references to le Chatelier's principle and to reaction tries to decrease the temperature/equilibrium shifts to right</p>	<u>reverse</u> reaction is endothermic	equilibrium shifts to left	1 1
(b) ii)	<p><b>M1</b> increase</p> <p><b>M2</b> fewer moles/molecules (of gas) on right (hand side)</p> <p><b>M2</b> dep on <b>M1</b></p> <p><b>IGNORE</b> references to le Chatelier's principle and to reaction tries to decrease the pressure/equilibrium shifts to right</p>	more molecules on left (hand side)	equilibrium shifts to left	1 1

(c)	(i)	$2\text{CH}_3\text{OH} + \text{O}_2 \rightarrow 2\text{H}_2\text{CO} + 2\text{H}_2\text{O}$ <b>M1</b> formulae <b>M2</b> balancing <b>M2</b> dep on <b>M1</b> <b>IGNORE</b> catalyst if on <u>both</u> sides or above arrow <b>IGNORE</b> state symbols	multiples and halves	2
	(ii)	<b>M1</b> – a substance that increases the rate of a reaction <b>IGNORE</b> alters the rate and any reference to enzymes <b>M2</b> and is chemically unchanged (at the end of the reaction) <b>IGNORE</b> references to takes no part in the reaction	mass does not change without being used up	1 1
	(iii)	<b>M1</b> provides an alternative reaction path(way)/route/mechanism <b>M2</b> (alternative path has a) lower activation energy [Activation energy can be described, e.g. the minimum energy needed (by colliding particles) for reaction to occur] <b>MAX 1</b> if any mention of particles gaining energy	<b>M1</b> molecules adsorb on/stick to the catalyst <b>M2</b> weakens the bonds in the reactant molecules	1 1
(d)	$2\text{CH}_3\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 4\text{H}_2\text{O}$ <b>M1</b> all formulae correct <b>M2</b> balanced <b>M2</b> dep on <b>M1</b> <b>IGNORE</b> state symbols	multiples and halves correct equation for methanal for one mark	2	
			<b>Total</b>	<b>14</b>