



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) $\pm 1^\circ$	CQ on candidate graph	1
		iv	E		1
				Total	7

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

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