Question	Answer	Marks	AO Element	Notes	Guidance
1(a)	CH_3O	**1**			
1(b)	no (C=C) double bonds	**1**			
1(c)	at least two alternating rectangles with attempted linking (1) **one** displayed ester link (all atoms and all bonds) (1) fully correct structure with at least one repeat unit including continuation bonds from correct atom or rectangle (1)	**3**			
1(d)	polyester	**1**			
2(a)	$Fe + H_2SO_4 \rightarrow FeSO_4 + H_2$	**1**			
2(b)	$Fe_2O_3 + 3H_2SO_4 \rightarrow Fe_2(SO_4)_3 + 3H_2O$ **M1** formula of $Fe_2(SO_4)_3$ **M2** all formulae correct (no additional species) **M3** balanced	**3**			

Question	Answer	Marks	AO Element	Notes	Guidance
3(a)	any **two** from: • 37 °C • anaerobic • glucose is aqueous • yeast	**2**			
3(b)	$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$ **M1** CO_2 as a product **M2** rest of equation	**2**			
3(c)	yeast is killed by the ethanol	**1**			
3(d)	slow rate of reaction	**1**			
3(e)	uses renewable resources / does not use a finite resource	**1**			
4	A - 1 and 2	**1**			
5	$2H_2 + O_2 \rightarrow 2H_2O$	**1**			**allow** multiples or fractions
6	D - Mg_3N_2	**1**			

Question	Answer	Marks	AO Element	Notes	Guidance
7(a)	$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$ **M1** species correct **M2** balanced	**2**			
7(b)	climate change / greenhouse effect / consequence of climate change	**1**			
7(c)	fermentation	**1**			
8(a)	V_2O_5	**1**			
8(b)	position of equilibrium shifts right/yield increases	**1**			
	to save energy	**1**			
8(c)	faster reaction/rate	**1**			
	more collisions per second/higher collision frequency	**1**			
	fewer moles/molecules (of gas) on right	**1**			
	(so) position of equilibrium shifts right/yield increases	**1**			

Question	Answer	Marks	AO Element	Notes	Guidance
9(a)	$6Li + N_2 = 2Li_3N$ species (1) balancing (1)	**2**			
9(b)	N^{3-} ion drawn correctly	**1**			
	charges correct (minimum 1 × Li ion and 1 nitride ion)	**1**			
10	$Zn + 2Ag^{+} \rightarrow Zn^{2+} + 2Ag$	**1**			
[Total: 36]					