

Energy from reactions

Mark scheme

1.	(a)	hydrogen + oxygen → water	1
		<i>accept $2H_2 + O_2 \rightarrow 2H_2O$ or balanced multiples or fractions</i>	
		<i>allow 1 or 2 correct formulae substituted for words</i>	
		<i>allow hydrogen oxide or steam for water</i>	
	(b)	supplied	
		released	1
		<i>both needed, must be in this order</i>	
	(c)	(i) B	1
		(ii) A	1
		(iii) to overcome activation energy to react or (activation) energy needed to start reaction	1
		<i>allow to provide energy</i>	
			[5]
2.	(i)	<u>Bonds broken</u>	4
		4 × (C - H)	
		2 × (O = O)	
		<i>each for 1 mark</i>	
		<u>Bonds formed</u>	
		2 × (C = O)	
		4 × (O - H)	
		<i>each for 1 mark</i>	
	(ii)	Total energy change in breaking bonds (4 × 413) + (2 × 498)	4
		<i>each gains 1 mark</i>	
		<u>Total energy change in forming bonds</u> (2 × 805) + (4 × 464)	
		but to break bonds = 2648 to form bonds = 3466	
		<i>each gains 2 marks</i>	
	(iii)	nett energy transfer = 818 (kj)	2
		this energy is released in the reaction/is an exothermic reaction	
		<i>(credit answers consistent with (ii) or derived from the initial information)</i>	
		<i>each for 1 mark</i>	
			[10]