Kinetics - Mark Scheme

Q1.

Question number	Answer	Mark
	D proportion of particles with sufficient energy to react	1

Q2.

Question number	Answer		Additional guidance	Mark
(a)	• $2H_2O_2 \rightarrow 2H_2O + O_2$	(1)	Ignore state symbols even if incorrect	2
	• iodide ions act as a catalyst (as they don't appear in the overall equation)	(1)		

Question number	Answer		Additional guidance	Mark
(b)			Example of calculation:	4
	• converts both temperatures from °C to K	(1)	$22.0°C = 295.0\ K$ $47.0°C = 320.0\ K$	
	• correct subtraction	(1)	$\ln\left(\frac{K_1}{K_2}\right) = -\frac{E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$	
	• substitute numbers in equation correctly	(1)	$\ln\left(\frac{4.90\times10^{-4}}{1.07\times10^{-3}}\right) = -\frac{E_a}{8.31}\left(\frac{1}{295} - \frac{1}{320}\right)$	
	• correct value of E_a	(1)	(+)56.(0) (kJ mol^{-1}) Sign and final answer to 2 or 3 SF Incorrect units loses MP4 Correct answer with no working scores 4	

Question number	Answer		Additional guidance	Mark
(c)(i)	An explanation that makes reference to the following points:			3
	• (blue-black colour is) product of starch-iodine reaction	(1)		
	• the iodine produced reacts (rapidly) with the thiosulfate ions (to reform iodide ions)	(1)		
	• when all of the thiosulfate has reacted, the blue-black colour appears.	(1)		

Question number	Answer	Additional guidance	Mark
(c)(ii)	• the reaction (between thiosulfate and hydrogen peroxide) is slow	Allow reaction has high E_a	1

Q3.

Question number	Answer		Mark
	D	titration of quenched samples	1

Q4.

Question number	Answer		Mark
	A	$dm^3\ mol^{-1}\ s^{-1}$	1