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Cambridge IGCSE Chemistry 0620 style

RATES OF REACTION – MARK SCHEME

Maximum mark: 45 (Core: 34). ";" separates marking points. Accept correct alternative wording. Apply error carried forward (ecf) where shown.

Question	Answer	Marks	Guidance
1(a)	carbon dioxide;	1	allow CO_2
1(b)	all 9 points plotted correctly to within half a small square;; smooth curve through the points, levelling off at 80 cm^3;	3	points: 2 marks for all 9 correct, 1 mark for 7–8 correct do not allow: dot-to-dot straight lines
1(c)	rate is fastest at the start and decreases (to zero); acid is used up / concentration of acid decreases; fewer collisions per second / lower frequency of collisions;	3	allow: calcium carbonate is used up (as the reason) do not allow: fewer collisions (no reference to time) for the third mark
1(d)	80 cm^3; (all) the calcium carbonate / marble has been used up;	2	do not allow: "the acid has run out" (acid is in excess)
1(e)	steeper curve at the start; levels off at the same final volume (80 cm^3) and sooner;	2	
1(f)	upturned measuring cylinder / burette (filled with water, in a trough);	1	allow: balance (to measure mass lost)
2(a)	any two from: use more concentrated acid; heat / increase temperature; use magnesium powder / smaller pieces / larger surface area;	2	do not allow: "more acid" (volume) or "stir" alone
2(b)	more (acid) particles in the same volume; more frequent collisions / more collisions per second;	2	do not allow: "more collisions" without reference to time for the second mark
2(c)	particles have more (kinetic) energy / move faster; more frequent collisions; a greater proportion / more of the collisions have energy equal to or greater than the activation energy;	3	allow: more successful collisions per second for the second mark
2(d)	dust has a (much) larger surface area; more frequent collisions with oxygen / very fast reaction (releases energy quickly);	2	

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Question	Answer	Marks	Guidance
3(a)	increases the rate of a reaction; is unchanged (chemically) at the end of the reaction;	2	allow: speeds up a reaction; not used up
3(b)	$2H_2O_2 \rightarrow 2H_2O + O_2$ O_2 correct; balancing (2 and 2) correct;	2	balancing mark only if O_2 is correct
3(c)	glowing splint relights;	1	test and result needed for the mark
3(d)	provides an alternative pathway / route; with a lower activation energy;	2	allow: more collisions are successful for the second mark
3(e)(i)	proteins that act as (biological) catalysts;	1	allow: biological catalysts
3(e)(ii)	the enzyme is denatured (at high temperature);	1	allow: active site changes shape; do not allow: enzyme is killed
4(a)(i)	temperature;	1	
4(a)(ii)	time (for the cross to disappear);	1	allow: rate
4(b)	0.031; 0.059;	2	allow 0.03 and 0.06; allow 1/32 and 1/17 if evaluated
4(c)	the higher the temperature, the faster the rate / shorter the time;	1	allow: rate about doubles for every 10 °C rise
4(d)	so it is a fair test / only temperature changes / same depth of liquid to look through;	1	
4(e)	any two from: same person judges every time; repeat each temperature and calculate a mean; use a light sensor / data logger instead of the eye;	2	
4(f)	use a fume cupboard / well-ventilated room;	1	allow: wear eye protection
5(a)	carbon dioxide (gas) escapes (from the flask);	1	
5(b)	lets gas out but stops acid spray escaping;	1	allow: stops liquid spitting out
5(c)	1.30 / 60; 0.022 g/s;	2	allow 0.0217; unit needed for the second mark
5(d)	concentration of acid / amount of reactants is highest at the start; so collisions are most frequent;	2	

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