AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	fatty acids **and** glycerol		1	AO1 2.2.1
01.2	pancreas **or** small intestine		1	AO1 2.2.1
01.3	temperature		1	AO2 2.2.1
01.4	so they were both at the correct temperature / temperature being investigated		1	AO2 2.2.1
01.5	as temperature increased (until 35 °C), rate of reaction increased		1	AO3 2.2.1
01.6	any **two** from: • no substrate / lipid was broken down • lipase / enzyme denatured • structure changed so it could no longer bind to lipid / lipid could not fit in active site		2	AO3 AO2 2.2.1
02.1	enzymes have specifically shaped active sites substrate molecules are a complementary shape to this site enzymes can only bind with one type of substrate (to form an enzyme-substrate complex)		1 1 1	AO1 2.2.1

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OXFORD Revise

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02.2	enzyme is not used up in reaction therefore can catalyse multiple substrate molecules	accept for 1 mark after substrate reacts, it is released so active site free for another substrate	1 1	AO1 2.2.1
02.3	any **one** from: • building starch / glycogen / cellulose • building lipids from fatty acids • building proteins from amino acids • combining carbon dioxide and water to form glucose	accept other appropriate examples	1	AO1 2.2.1
02.4	increased temperature will cause body enzymes to denature which will prevent chemical reactions vital to life from occurring (efficiently) it could also damage / denature enzymes in viruses preventing virus from infecting person / causing further damage to body / reproducing		1 1 1 1	AO3 2.2.1
03.1	proteins		1	AO1 2.2.1
03.2	amino acids make up proteins; so needed to form enzymes/hormones/antibodies/structural tissue	accept other sensible roles of amino acids.	1 1	AO1 2.2.1
03.3	2.2	Accept 2.1–2.3	1	AO2 MS4a 2.2.1

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03.4	A – in the stomach optimum pH in area of high acidity B – in the small intestine optimum pH slightly above 7		1 1 1 1	AO2 2.2.1
03.5	many stains are food products enzymes break down insoluble molecules into soluble molecules which would be removed from clothing by detergent / water	accept any named source of staining credit named example, e.g. proteins to amino acids	1 1 1 1	AO2 2.2.1
03.6	(most) enzymes are denatured at 60 °C therefore, they are no longer able to bind to the food / stain (to break it down)	accept description of active site being changed	1 1	AO2 2.2.1
04	**Level 3:** All key steps are identified and logically sequenced. A safety precaution and at least two control variables are identified.		5–6	AO2 AO3 4.2.2.1
	Level 2: Most steps are identified, but the method is not fully logically sequenced. A safety precaution or control variable is identified.		3–4	
	Level 1: Some relevant steps are identified, but links are not made clear.		1–2	
	No relevant content		0	

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	Indicative content for method: • using the measuring cylinder, add a fixed volume (e.g. 5 cm^3) of starch solution to each test tube • using the pipette, alter pH of starch solutions by adding a fixed volume (e.g. 1 cm^3) of a different pH buffer solution to each tube • add one drop of iodine solution to each point on the spotting tile • using pipette, add a fixed volume (e.g. 1 cm^3) of carbohydrase solution to the first tube and stir / mix • start stopwatch. • using glass rod, remove a droplet of starch/carbohydrase mixture and add to the iodine solution • repeat this step every minute until iodine solution does not turn blue-black • record time value • repeat for all pH values being investigated **Safety precautions**: • wear goggles • ensure glassware is kept in centre of workspace • use test-tube rack to hold test tubes **Control variables**: • solutions at same temperature (check with thermometer) • use same volume of starch / carbohydrase / pH buffer in each tube • use same concentration of starch / carbohydrase / pH buffer in each tube			
05.1	break down proteins Into amino acids		1	AO1 4.2.2.1

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05.2	water bath		1	AO3 4.2.2.1
05.3	40 °C		1	AO2 4.2.2.1
05.4	rate = $\frac{1}{\text{time}}$ = $\frac{1}{12}$ rate of reaction = 0.08(3) per min / min^{-1}	accept correct identification of 12 min as time	1 1 1	AO1 AO2 4.2.2.1 MS 1c
05.5	**advantage**: enzyme speeds up digestion of egg white / protein so protein stains would be removed during clothes washing **disadvantage**: enzyme only (very) effective at limited range of temperatures so other stains may not be removed at the temperatures the enzyme works most effectively	accept other reasonable suggestions with relevant argument from the data accept enzyme less effective below 30 °C / above 50 °C	1 1 1 1	AO3 4.2.2.1
06.1	speeds up a reaction without being used up		1 1	AO1 4.2.2.1
06.2	burns brightly		1	AO2 4.2.2.1

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06.3	concentration or ph of hydrogen peroxide / catalase		1	AO2 4.2.2.1
06.4	to identify anomalous results / to improve accuracy of data		1	AO2 4.2.2.1
06.5	5.0 cm	do not accept 3.9 (1.8 is an anomaly)	1	AO2 4.2.2.1 MS 1c, 2b, 2f
06.6	enzyme had been denatured / protein shape changed can no longer bind to hydrogen peroxide to break it down		1 1	AO2 4.2.2.1
06.7	repeat experiment at temperatures between 20 °C and 40 °C redraw graph using additional data to identify optimum temperature		1 1	AO3 4.2.2.1
07.1	proteins		1	AO2 4.2.2.1
07.2	pH 8		1	AO2 4.2.2.1

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07.3	any **three** from: • enzymes and substrate fit together (like a lock and key) • enzymes have a specific / unique active site • this is complimentary to / fits into the shape of the enzyme • they bind to form an enzyme-substrate complex and molecule is broken down		3	AO1 4.2.2.1
08.1	bell-shaped curve peak at +37 °C	accept peak in range +35 °C to +40 °C	1 1	AO2 4.2.2.1
08.2	bell curve with peak to the left of the human graph peak around 0 °C	Accept peak anywhere in range –20°C to +10°C	1 1	AO3 4.2.2.1
09.1	any **three** from: • the bonds in an enzyme / the forces in an enzyme • hold the enzyme / protein in its 3 dimensional shape • a change in pH affects the forces in the bonds leading to a change in the shape (of active site) • if pH change is too great the enzyme will no longer bond to the substrate		3	AO1 4.2.2.1
09.2	protease		1	AO1 4.2.2.1

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09.3	any **four** from: • place milk samples in water baths at different temperatures • place first temperature sample in machine and measure proportion of light which passes through / is transmitted • add casein and measure time taken to reach selected % transmission, e.g. 50% • repeat for all temperature samples • plot graph of temperature against time – curve minimum point will show optimum temperature		4	AO2 4.2.2.1
09.4	systematic error all % transmission results would be lower than expected but optimum temperature would still be identified		1 1 1	AO3 4.2.2.1
10.1	Single-celled organisms have a large surface area : volume ratio		1	AO1 1.3.1 2.2.2

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10.2	any **four** from: • diaphragm contracts / flattens • intercostal muscles contract, pulling ribcage up and out • volume of chest cavity increases • pressure inside chest cavity decreases external / atmospheric air pressure greater (causing air to move into the lungs)		4	AO1 2.2.2
10.3	spherical shape gives large surface area – maximise area for diffusion thin walls – shorter diffusion distance good blood supply – maintain large diffusion gradient		1 1 1	AO1 1.3.1 2.2.2