

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance	
17	a	<p>A hepatic vein as blood leaving liver (1)</p> <p>B hepatic artery as blood entering liver through narrow vessel (1)</p> <p>C hepatic portal vein as blood (from gut) entering liver through branched vessel (1)</p>	3		
	b	i	mitochondrion	1	ALLOW mitochondria.
		ii	<p><i>either</i></p> <p>facilitated diffusion (1)</p> <p>conversion of ornithine into citrulline creates concentration gradients</p> <p>or</p> <p>(molecules are not lipid soluble so) require protein channels to cross membrane (1)</p> <p>or</p> <p>active transport (1)</p> <p>ornithine and citrulline need to be moved into and out of D</p> <p>more quickly than would be met by diffusion (1)</p>	2	
		iii	deamination / removal of NH ₂ group from amino acid (1)	1	
		iv	ATP (1)	1	
	c	i	<p><i>two from</i></p> <p>pH</p> <p>temperature</p> <p>substrate / hydrogen peroxide concentration (1)</p>	1	<p>Two answers required for 1 mark.</p> <p>DO NOT ALLOW an answer that includes mass of liver / enzyme concentration.</p>
		ii	<p><i>pH</i></p> <p>take pH reading / ensure hydrogen peroxide is same pH for all enzymes concentrations tested (1)</p> <p><i>temperature</i></p> <p>use liver tissue and hydrogen peroxide at room temperature / same temperature for all enzyme concentrations tested (1)</p> <p><i>substrate concentration</i></p> <p>use same concentration and volume of hydrogen peroxide for all enzyme concentrations tested (1)</p>	1	

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	iii	<p>* Level 3 (5–6 marks) Deduction includes coherent interpretation of the evidence, clearly linking all ideas to explain why and how activity is regulated.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) Deduction includes clear use of some evidence to support conclusion but ideas may not be clearly linked for both how and why.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</i></p> <p>Level 1 (1–2 marks) A simple deduction about how or why based on a limited interpretation of the evidence.</p> <p><i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p>0 marks No response or no response worthy of credit.</p>	6	<p>Relevant points include:</p> <p><i>Why</i></p> <ul style="list-style-type: none"> • large quantities of hydrogen peroxide and high turnover number of catalase would mean vigorous reaction and lots of oxygen produced very quickly. <p><i>How</i></p> <ul style="list-style-type: none"> • isolation of catalase in peroxisomes • released in small quantities • cells can limit expression of catalase • this effectively limits enzyme concentration and therefore reduces reaction rate • cells have no control over temperature or substrate concentration so enzyme concentration is the only method of control.
		Total	16	