C1.1 Enzymes and metabolism (HL)

What the Cell · DP Biology · worksheet · HL statements C1.1.11–17

Name _____ **Date** _____ **Total** _____ / 40

About 40 minutes, or one section at a time. The number of marks shows how many separate points to make.

Section A: Recall

9 marks

1 **State** one example of an intracellular and one of an extracellular enzyme-catalysed reaction. C1.1.11 **[2]**

2 **State** why metabolic reactions always release some heat. C1.1.12 **[1]**

3 **Name** two cyclical metabolic pathways. C1.1.13 **[2]**

4 **Name** the enzyme that statins inhibit. C1.1.15 **[1]**

5 **Name** the enzyme that isoleucine inhibits. C1.1.16 **[1]**

6 **State** the enzyme that penicillin inhibits and the effect on the bacterium. C1.1.17 **[2]**

Section B: Understanding

15 marks

7 **Compare** linear and cyclical metabolic pathways. C1.1.13 **[3]**

8 **Explain** how a molecule binding to an allosteric site can inhibit an enzyme. C1.1.14 **[3]**

9 **Explain** how feedback inhibition by isoleucine benefits a bacterial cell. C1.1.16 [3]

10 **Explain** how a change in transpeptidase can make bacteria resistant to penicillin. C1.1.17 [3]

11 **Explain** how heat from metabolism helps mammals and birds. C1.1.12 [3]

Section C: Working with evidence

10 marks

All data in this section are invented for practice. The patterns are realistic.

12 C1.1.14, C1.1.15, C1.1.17

The initial rate of an enzyme reaction was measured at different substrate concentrations, with no inhibitor, with inhibitor P, and with inhibitor Q (same concentration of each inhibitor).

Substrate / mmol dm^{-3}	**1**	**2**	**5**	**10**	**20**
No inhibitor / µmol min^{-1}	25	40	63	78	88
Inhibitor P	12	22	45	66	83
Inhibitor Q	12	20	32	39	44

a **Calculate** the percentage reduction in rate caused by Q at 20 mmol dm^{-3}. **[2]**

b **Identify** which inhibitor is competitive, giving evidence from the data. **[2]**

c **Explain** why adding more substrate does not overcome inhibitor Q. **[2]**

d A third inhibitor, R, stopped the reaction completely. Activity did not return when R was removed by dialysis. **Deduce** the type of inhibition, with a reason. **[2]**

e **State** one variable that must be kept constant. **[1]**

f **Explain** why initial rates were measured. **[1]**

Section D: Longer answer

6 marks

13 **Discuss** the use of enzyme inhibitors as medicines, using statins and penicillin as examples. C1.1.15, C1.1.17 **[6]**