

KEY

4. An experiment was conducted to measure the effects of the presence of thyroxin and temperature on oxygen use in human tissue cells. Two tissue samples were prepared as shown below.

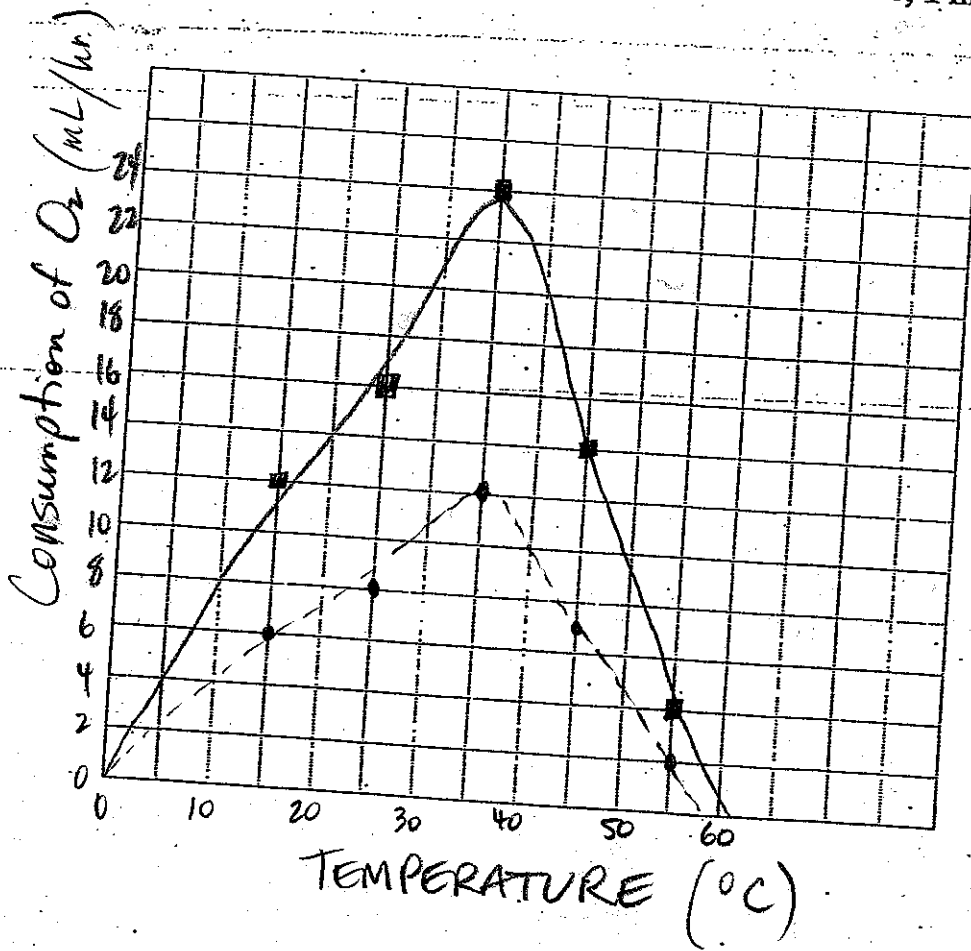
Sample A: 50 grams of muscle tissue was added to a nutrient solution.

Sample B: 50 grams of muscle tissue was added to a thyroxin and nutrient solution.

Oxygen consumption was measured at various temperatures. The results are shown below.

Temperature (°C)	Consumption of oxygen (ml/hour)	
	Sample A muscle tissue	Sample B muscle tissue + thyroxin
15°C	6	12
25°C	8	16
35°C	12	24
45°C	7	14
55°C	2	4

a) Use the grid provided to graph the data in the table above. Label the x-axis as temperature. (2 marks: 1 mark for correct scale and labels; 1 mark for plotting and lines)



Use the following lines to plot your data:  
Sample A -----  
Sample B \_\_\_\_\_

- b) Based on your graph of the data for sample B, predict the amount of oxygen consumed per hour at 20°C. (1 mark)

Amount of oxygen consumed: ~ 14 mL/hr.

- c) Explain the difference observed in the results of samples A and B. (1 mark)

Sample B has THYROXINE, which is a hormone that increases metabolic rate. Thus muscles function (metabolize) faster in sample B compared to sample A (no thyroxine)

- d) Explain the results for sample B at each of the following temperatures.

(3 marks: 1 mark each)

15°C:

Not optimal temp. (ie. not body temp.) ∴ less KE and less collisions ∴ less effective collisions ⇒ ↓ rxn. rate.

35°C:

Optimal temp (~ body temp.)  
optimal KE etc... see above.

55°C:

Muscle protein begins to denature so it cannot bind with thyroxine and/or function (metabolize) properly. Also KE too high, collisions too hard for rxn to occur!