3 A liquid is placed inside a closed container. Some of the liquid evaporates.

The pressure of the vapour above the surface of the liquid increases to a maximum value. This maximum pressure is called the saturated vapour pressure.

(a) The table shows data for the saturated vapour pressure P at different absolute temperatures T.

P / kPa	T / K		
7.8	308		
17.0	323		
34.6	338		
66.1	353		
120.1	368		
208.1	383		

(i) Plot a graph of $\log P$ against $\dfrac{1}{T}$ on the grid opposite. Use the additional columns for your processed data.

(6)

(ii) Determine the gradient of the graph.

(3)

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Gradient = ...

(iii) The gradient of the graph of log P against $\dfrac{1}{T}$ is given by

$$\text{gradient} = -\dfrac{X}{2.30k}$$

where X is a constant with unit joules, and k is the Boltzmann constant.

Determine the value of X in joules.

(3)

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$X = $ .... J

(b) Liquids boil when the saturated vapour pressure is equal to atmospheric pressure.

Determine the boiling point of the liquid in °C when the atmospheric pressure is 100 kPa.

(3)

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Boiling point = ... °C

(Total for Question 3 = 15 marks)