Question 29 **(7 marks)**

Water can self-ionise, as shown by the following equation:

$$H_2O(\ell) \rightleftharpoons H^+(aq) + OH^-(aq)$$

The reaction equilibrium and the pH of water are both affected by changes in temperature. The data in the following table show how changing the temperature affects the pH of pure water.

Temperature (°C)	pH of water
0	7.47
25	7.00
50	6.63
75	6.35

(a) Show how the tabulated data and Le Châtelier's Principle can be used to deduce whether the self-ionisation of water is exothermic or endothermic. Calculations are **not** required. (5 marks)

(b) Calculate the $H^+(aq)$ and $OH^-(aq)$ concentrations of pure water at 100.0 °C given that K_w is equal to 5.13×10^{-15} at that temperature. (2 marks)