Question 28 **(10 marks)**

A hydrogen sulfate/sulfate system is represented by the following equation.

$$HSO_4^-(aq) + H_2O(\ell) \rightleftharpoons SO_4^{2-}(aq) + H_3O^+(aq)$$

(a) Predict how

- the forward reaction rate and
- the pH

will differ from their original values after the following changes are imposed on the system and equilibrium has been re-established. Use the terms **increase**, **decrease**, **no change**.

(6 marks)

Change imposed by the addition of	**Effect on forward reaction rate when equilibrium is re-established**	**Effect on pH when equilibrium is re-established**
a few drops of concentrated hydrochloric acid		
a few drops of concentrated lead(II) nitrate solution		
distilled water		

(b) The reaction in part (a) is endothermic in the forward direction as written. Predict what will happen to the pH when the temperature is increased. Justify this prediction. (4 marks)