**Question 31** **(6 marks)**

Arsenic acid, $H_3AsO_4(aq)$, is a weak, triprotic acid that can be produced from the element directly through the reaction with water and ozone, $O_3(g)$. This reaction can be represented by the equation below.

$$2\,As(s) + 3\,H_2O(\ell) + 5\,O_3(g) \rightleftharpoons 2\,H_3AsO_4(aq) + 5\,O_2(g)$$

(a) Write the equilibrium constant expression for this reaction. (2 marks)

(b) The arsenate ion, $HAsO_4^{2-}(aq)$, is amphoteric, meaning it can act as an acid and as a base.

(i) With the aid of equations, describe the amphoteric nature of $HAsO_4^{2-}$ in this aqueous solution. (3 marks)

(ii) State why an aqueous solution containing $HAsO_4^{2-}$ is found to have a pH>7 at 25 °C. (1 mark)