Question 27 **(13 marks)**

Calcium hypochlorite, $Ca(OC\ell)_2(s)$, is used for the treatment of water in swimming pools and is sold as 'pool chlorine'.

(a) Explain why a basic solution is produced when 'pool chlorine' is dissolved in the pool water. Include an equation in your answer. (4 marks)

Equation

A pool chemical used to counteract the basicity of the pool water is hydrochloric acid, HCℓ(aq). It is sold as 'pool acid'.

(b) State what happens to the pH of the pool water when 'pool acid' is added to the pool water. Include an equation to illustrate your statement. (3 marks)

Equation

'Pool chlorine' and 'pool acid' must be stored separately from each other because calcium hypochlorite can react explosively on contact with hydrochloric acid. The equation for this reaction is given below.

$$Ca(OC\ell)_2(s) + 4\ HC\ell(aq) \rightarrow CaC\ell_2(aq) + 2\ H_2O(\ell) + 2\ C\ell_2(g)$$

(c) Sketch a clearly-labelled energy profile diagram illustrating the reaction between the 'pool chlorine' and the 'pool acid'. (6 marks)