

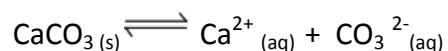
Question One

The K_a for propanoic acid is $1.35 \times 10^{-5} \text{ mol L}^{-1}$ at 25°C

- (a) Write the K_a expression for the dissociation of propanoic acid, $\text{CH}_3\text{CH}_2\text{COOH}$.
- (b) Calculate the pH of a 0.120 mol L^{-1} solution of propanoic acid at 25°C . Include any assumptions you may make.
- (c) Calculate the pH of a 0.120 mol L^{-1} solution of sodium propanoate at 25°C . Include any assumption you may make.
- (d) What is the concentration of propanoic acid in the solution that gives a pH of 4.5

Question Two

Shellfish build shells mainly of calcium carbonate, which is only slightly soluble in water.



- Write the K_s expression for CaCO_3
- K_s for CaCO_3 at 25°C is 5.0×10^{-9} . Calculate the solubility of CaCO_3 in pure water.
- What would be the solubility of CaCO_3 in 0.1 molL^{-1} of Na_2CO_3
- Discuss with equations and calculations if a precipitate of CaCO_3 will form when 85 mL of sea water with Ca^{2+} concentration of 0.0260 molL^{-1} is mixed with 900 mL of Na_2CO_3 solution with a concentration of 0.020 molL^{-1}