- The reaction order for a chemical reaction is given by the sum of the powers in the rate law. Why is the reaction order usually given by a small positive integer, *i.e.* 2 or less?

The rate of a reaction is determined by the slowest step (the rate determining step). This step usually involves 2 species colliding or a single species spontaneously undergoing a change. The rate law for this step then depends on the concentrations on the species involved in this step.

If 2 species are involved, then the rate will be proportional to the concentration of each giving an overall order of 1 + 1 = 2. If 1 species is involved, then the rate will be proportional to its concentration so the overall order will be 1.

Are zero order reactions possible? Explain your answer using examples if possible.

A zero order reaction is one in which the rate does not depend on the concentration of the reactant(s). These are known and typically occur when the reaction is dependent on the availability of a catalyst. For example:

- **A reaction of a gas which occurs on the surface of a metal will become independent of the concentration of the gas if all of the metal surface is saturated with reactants.**
- **A reaction of a substrate on an enzyme will become independent of the concentration of the substrate if the active centres in the enzyme are saturated.**