Question 30 **(8 marks)**

Carbonyl chloride, $COC\ell_2$, is a colourless, poisonous gas that is used in the production of insecticides and a variety of plastics. It is produced through the exothermic reaction between carbon monoxide and chlorine gases. Carbonyl chloride is a liquid below 8 °C at 100.0 kPa.

The following equation is used to represent the reaction.

$$CO(g) + C\ell_2(g) \leftrightharpoons COC\ell_2(g) \qquad \Delta H < 0$$

(a) For this industrial process state the conditions that would optimise the: (2 marks)

rate of reaction _____

_____

yield _____

_____

(b) State **one** compromise in conditions that might be required to produce carbonyl chloride, $COC\ell_2$, in an industrial process. Explain the effect of this condition on the rate and yield and justify why this compromise is required. (6 marks)