

# DIRECT SYNTHESIS OF HYDROGEN PEROXIDE IN METHANOL - SUPERCRITICAL CO<sub>2</sub>

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The direct synthesis of hydrogen peroxide is a promising method of production that is still under investigation. The importance of the catalyst is crucial, but also the solvent used, due to the large quantities required as H<sub>2</sub> and O<sub>2</sub> need to be solubilised. Methanol and alternatively mixtures of methanol/water have been used as solvent in the literature, the addition of CO<sub>2</sub> expands the methanol phase increasing the solubility of the gases and therefore increasing the reaction rate. An experimental apparatus, model of the system and preliminary results are presented.

This study comprises the study of the reaction in three steps, as listed below. For this case the influence of temperature, catalyst concentration and partial pressures and initial concentrations is studied in detail.

1. Decomposition reaction.
2. Hydrogenation reaction.
3. Direct synthesis reaction of H<sub>2</sub>O<sub>2</sub> and H<sub>2</sub>O.

A Pd/C catalyst has been used at pressures up to 12.0 MPa and temperatures between 10 and 60°C. Concentrations of methanol up to near 4%wt were achieved.