**Physical and Chemical Properties of Materials**

**Based on Hydrolyzed Chitosan**

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### Introduction

The chitosan (CS) has been shown to be a good candidate as a heterogeneous catalyst support. The incorporation of titanium (Ti) into CS lead to the increase of the surface area of the CS and without consuming the amino groups, which are active for catalysis. However, for catalysis there is a need for a high surface area that is accessible to the reactants. Hence, the effect of polymer molecular weight is expected to have an effect on the obtained surface area. The molecular weight of the CS can be reduced by controlling the hydrolysis conditions. In this work we evaluate the effect of hydrolysis time on the obtained surface area and the pore size distribution. This is performed for both CS and CS with Ti.

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### Material Synthesis

- **CS as Received**
- **CS After Initial Treatment**
- **TiCl4 Addition**

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### Physical and Chemical Properties of CS vs. Hydrolysis Time

- **N2 Physisorption**
  - The pore size and shape is affected by the CS hydrolysis time
  - The BET surface area has an optimum

- **FTIR**
  - The degree of hydrolysis can be evaluated from FTIR
  - The glycosidic bond concentration reaches a plateau as a function of hydrolysis time

- **N2 Physisorption**
  - The Ti incorporation increases the CS surface area
  - The CS hydrolysis time has no effect on the pore size and shape

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### Conclusions

- The pore size and shape is affected by the CS hydrolysis time
- The BET surface area vs. the hydrolysis time has an optimum
- The degree of hydrolysis can be evaluated from FTIR
- The glycosidic bond concentration reaches a plateau as a function of hydrolysis time
- The Ti incorporation increases the CS surface area
- The CS-Ti-NH2 incorporation has no effect on the pore size and shape
- The surface area of CS-Ti-NH2 reaches an optimum at hydrolysis time of 48h
- As the residence time is longer, the cross linking level is higher

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### References