

Experiment 4: Acidic hydrolysis of chitin and chitosan and analysis of the products of hydrolysis

Duration: 90 minutes.

Equipment: 2 round-bottom flask (250 ml), 2 cork rings, measuring cylinders (100 ml and 10 ml), 2 reflux condenser, 2 heating coils, 2 magnetic stirrer, 2 stir-ring rods, tubing, retort stand material, filter rack, filter paper, glass filter. Reagents and materials: Chitin, chitosan, diluted hydrochloric acid, w(HCl) = 7 %, concentrated hydrochloric acid, w(HCl) = 24 %, acetic acid, w(C₂H₄O₂) = 12 %, Fehling's solution I and II.

Procedure: 1 g of chitin and 1 g of chitosan are added each to a round-bottomed flask filled with 100 ml of diluted hydrochloric acid. 10 ml of concentrated hydrochloric acid are added to each mixture. The flasks are heated to reflux for one hour. The reaction mixtures are allowed to cool down and then filtered off. 2 - 3 ml of each filtrate are mixed with 2 ml of Fehling's solution I and 2 ml of Fehling's solution II and the mixtures are heated for some minutes in a water bath. For comparison some flakes of chitosan are dissolved in acetic acid and mixed also with Fehling's solutions.

Observation: Major parts of chitin and chitosan dissolve on heating with hydrochloric acid. The solutions are freely filterable, i.e. they are not viscous such as the chitosan/acetic acid solution. The Fehling's test proves feasible with the solution, in the case of chitosan it fails.

Faults and precaution: The addition of too much concentrated hydrochloric acid results in a decomposition of chitin and chitosan.

Waste disposal: The filtrates are needed for experiment 5. Filtration residues are added to the waste jar for solids. The samples obtained by the Fehling's test are neutralized and added to the waste jar for heavy-metal solutions.

