

Teaching-learning materials compiled by the PARSEL consortium
as part of an EC FP6 funded project (SAS6-CT-2006-042922-PARSEL)

Cooperating Institutions and Universities within the PARSEL-Project:



Chitosan – Fat Magnet!?

A grade 12-13 chemistry/ biology module on
Poly-saccharides and nutrition

Abstract:

There is much advertising on chitosan as a fat magnet. What is chitosan? Does it really work? Should we use it to avoid gaining weight? Students look for answers to these questions by researching the internet, and other sources, and doing own experiments. They learn how to produce chitosan, about its properties and several kinds of its application. The newly gained knowledge and competences form the base for the final discussion and decision making.

Sections included		
1.	Student activities (for the students)	Describes the scenario in more detail and the tasks the students should perform
2.	Teaching guide	Suggests a teaching approach
3.	Teacher notes	Gives detailed information about the experiments and papers about the theoretical background

Overall Objectives/Competencies: The students are expected to attain as well scientific concepts as also related skills:

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Scientific concepts: Chemical structures of chitin and chitosan and its properties, chitosan's possible reactions in human body, applications of chitosan in different areas (biochemistry/medicine, cleaning water, preparing fruit juice ...) and its explanations based on the substances properties

Skills: Formulating an inquiry question and a hypothesis, planning and performing an inquiry, planning and performing an experiment, communicating and presenting ideas and results, managing information and knowledge, identifying, evaluating and using information from the internet and other sources, using digital mind mapping to support one's performance, communicate with partners from industry, make own decisions based on scientific knowledge and personal values

Curriculum content: Carbohydrates (Poly saccharides) , healthy nutrition/balanced diet

Kind of activity: Cognitive apprenticeship, internet recherche, lab experiments, classroom discussion and presentation, school industry cooperation

Anticipated time: 8 to 12 lessons

Prior Learning: Carbohydrates, Cellulose

Task description:

Many nations with coastal regions involved in fishing or breeding crustaceans (crabs, shrimps,) are confronted with the problem of millions of tons of waste in the form of crab shells. Intensive research has found several applications for the main ingredient chitosan to solve this environmental problem producing valuable products from waste. This module will give an introduction to chitosan, works out how to cope with the environmental problem of crab waste and evaluate critically the various forms of applications. The teaching approach is chosen in accordance to the cognitive apprenticeship model (see teacher notes). During the modelling phase the teacher (as an expert) introduces the students to the content of crab shells, chitosan and its application as a fat reducer, as well as to the competences and strategies of how to solve everyday life science based questions and find adequate decisions. During the group phase the students work self-directed in small groups on self-chosen questions which have not been answered during the modelling phase.

One of the most popular applications of chitosan is slimming enhancing. Chitosan: Best friend of the bodybuilder! Chitosan – gives fat a ticket out of your body! These are slogans used by producers in advertisements. But are they right? Do they tell the truth? And how should this work?

The effectiveness of chitosan is an adequate problem to work on. Chitosan can be gained from Chitin, structural substance of crab- or shrimp shells. Following cellulose it is the second frequently met naturally produced polymeric worldwide, so it's no exotic substance but quite common and with many application opportunities. For teaching chemistry it's also important that it can easily be used to demonstrate structure-property interdependencies.

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