Experiment E: Preparation of Chitosan Films

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| **Source:** |

According to Bader, Birkholz, in: Chitin Handbook, R.A.A. Muzzarelli and M.G. Peter, eds., European Chitin Society. 1997. ISBN 88-86889-01-1

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| **Equipment:** |

2 beaker (250 ml), magnetic stirrer with heating plate, stirring rod, Pasteur pipette, small-meshed strainer, 2 plastic plates (30 cm x 30 cm) or rinsing bowl

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| **Reagents and materials:** |

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| **Reagents and materials** | **H-Phrases** | **P-Phrases** | **Danger symbol** |
| Chitosan |  |  |  |
| Acetic acid (w=12%) | 226, 314 | 210, 260, 280, 303, 304, 305, 310 | http://www.seilnacht.com/Chemie/ghs02.gifhttp://www.seilnacht.com/Chemie/ghs05.gif |
| Tetraethylene glycol |  |  |  |

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| **Procedure:** |

**![j0346317[1]]() Do not forget safety glasses, safety gloves and lab coat! Work at the extractor hood!**

Two beakers are filled each with 2 g of chitosan and 100 ml of acetic acid. Under slight heating and stirring the chitosan is dissolved. After cooling one of the solutions is poured through a strainer onto a plastic plate or on the backside of a rinsing bowl. The content of the second beaker is mixed with 0.2 g of tetraethylene glycol; the mixture is stirred for some minutes. Afterwards this solution is poured through a strainer onto a plastic plate or on the backside of a rinsing bowl too. The slightly viscous solutions are not smoothed down. The solvent is allowed to vaporize under the extractor hood overnight.

**** Immediately after use, the strainer should be cleaned with running water.

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| **Observation:** |

After the vaporization of the solvent in both experiments a flexible, tear resistant and transparent film remains, which is easily peeled off the plate. The film with additional tetraethylene glycol is softer than the pure chitosan film

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| **Analysis: (**Pictures of the formulas created with Chemdraw) |

For the creation of transparent films, the film-creating characteristics of the macro molecule chitosan are used, which are caused by intra- and inter-molecular hydrogen bonds. Tetraethylene glycol can serve as a softening agent in this case, as it inserts itself into the chitosan molecules under the creation of hydrogen bonds.



Chitosan film without softening agent

Chitosan film with tetraethylene glycol as softening agent

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| **Source of errors:** |

If the solutions are poured directly onto plastic plates without using strainer, it is possible that chitosan particles not dissolved, completely cause thickenings and uneven patches. Besides, pouring through strainer prevents the formation of bubbles.

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| If too much of the softener is added, the two components separate and after some time the softener forms oily drops on the film.**Links:** |