Experiment F: Clarification of Fruit Juices

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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:** |

Beaker (100 ml), magnetic stirrer, stirring rod, centrifuge, centrifuge tubes, Pasteur pipette, light source (e.g. laser).

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| **Reagents and materials:** |

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| **Reagents and materials** | **H-Phrases** | **P-Phrases** | **Danger symbol** |
| Chitosan |  |  |  |
| Naturally cloudy juice (e.g. apple juice) |  |  |  |

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| **Procedure:** |

**![j0346317[1]]() Do not forget safety glasses and lab coat!**

50 ml of naturally cloudy apple juice are mixed with 0,1 g of chitosan and the mixture is stirred for 5 minutes. Then the solution is centrifuged for 10 minutes. Parallel, 50 ml of naturally cloudy apple juice without additional chitosan are centrifugated as blank test.

****  The solutions are poured down the sink.

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| **Observation:** |

The centrifugate of the apple juice mixed with chitosan is completely clear and no Tyndall effect is visible. In opposite, the centrifugate of the untreated apple juice shows same cloudiness as before. The Tyndall effect is visible.

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

Fruit juice without addition of chitosan does not show any clarification when filtrated and centrifugated as it is a suspension, in which natural poly-anionic tannins and other matter exist colloidally suspended. Fruit juice does not show a Tyndall effect after adding chitosan and centrifugating it. This is due to the poly-cationic characteristics of chitosan. As a poly-cation, chitosan builds ionic macromolecular complexes with these compounds which can be centrifugated off.



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| **Source of errors:** |

If too much chitosan is added, the centrifugate remains cloudy. Use original fruit juice without any conservation agents or solubilizer.

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| **Links:** |

*Tyndall effect:* An effect of light scattering by colloidal particles or particles in suspension. It is named after the 19th century Irish scientist John Tyndall. It is similar to Rayleigh scattering, in that the intensity of the scattered light depends on the fourth power of the frequency, so blue light is scattered more strongly than red light. An example in everyday life is the blue colour sometimes seen in the smoke emitted by motor bikes. The phenomenon is best explained as the particle size is much greater than the wavelength of light.. *Source:* <http://en.wikipedia.org/wiki/Tyndall_effect>