UNIVERSITY OF AMSTERDAM
Institute of Physics

AkzoNobel

Master research project (3 or 10 months) 12 Ec or 60 EC

The effect of anticaking agents on NaCl

Supervisors:

UvA: Noushine Shahidzadeh (n.shahidzadeh@uva.nl), Daniel Bonn (d.bonn@uva.nl)

AkzoNobel-Deventer: Bart Zwijnenburg (RD&I Manager Salt) (bart.zwijnenburg@akzonobel.com)

Laboratory:

1-**Institute of Physics-WZI –Soft Matter group**- University of Amsterdam- The Netherlands

2-Akzo Nobel Industrial Chemicals B.V., Zutphenseweg 10, 7418 AJ Deventer, PO Box 10, 7400 AB Deventer

Research conditions : This master research project is a collaborative project between AkzoNobel and the, IoP -Soft Matter group. The main part of the research will be done in the Soft Matter group at the University of Amsterdam in close collaboration with the R&D department of the AkzoNobel in Deventer. During the project, the student will also visit AkzoNobel Deventer to share results and get to know with the activities in the company. There will be a monthly gratification of around 500 € from AkzoNobel during the period of the project.

Research project :

AkzoNobel is one of the leading salt companies in the world, and the Soft Matter group has extensively studied salt crystal formation and growth. Both are interested in Sodium Chloride (NaCl), which is the most abundant salt on earth and consequently its crystallization is a key factor in many processes. Because of the hygroscopic properties of NaCl, salt grains have the tendency to lump, *cake*, together and form larger crystals. This caking process makes salt handling e.g. storage and transport difficult. Consequently, additives known as *anti-caking agents* are added to the salt in order to prevent crystals from growing together and agglomerating. However the physics behind the working of such agents remains ill-understood. In addition, the standard anticaking agent, ferrocyanide, has several limitations, among which its impact on the environment.

A new generation of anticaking agent from biorenewable sources was recently launched by AkzoNobel. Our joint research project aims to develop a fundamental understanding of the anticaking mechanism of both anticaking agents for NaCl. We will therefore study their effect on NaCl crystal growth, dissolution and drying. This will be done both at micro- and macroscopic scale, using different microscopy techniques. The fluidity of the granular medium (NaCl grains) with and without additives will be studied using the rheology platform available at the UvA, allowing to connect the efficiency with the mechanism of anticaking. Moreover, the incorporation of the anticaking agents in the crystalline structure by co-crystallization processes will also be investigated.