

## Opponent's assessment of the diploma thesis

### **SELF-CROSSLINKING FILM-FORMING LATEXES PREPARED USING SUNFLOWER OIL-BASED MONOMER**

Author: MSc. Nicholas Ebukolo

Work supervisor: doc. Ing. Jana Machotová, Ph.D.

Workplace: Univerzita Pardubice, Fakulta chemicko-technologická, Ústav chemie a technologie makromolekulárních látek

Thesis opponent: Ing. Mgr. Bc. Radka Kopecká, Ph.D., Masarykova univerzita Brno, Přírodovědecká fakulta, Ústav chemie

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#### **Actuality of the thesis topic:**

The diploma thesis entitled Self-crosslinking film-forming latexes prepared using sunflower oil-based monomer is, due to the problem solved and the renewable ecological resources used, a very up-to-date work that brings a new perspective on the possible use of sunflower oil-based monomers in practice.

#### **Fulfilling the goals of the thesis:**

The thesis contains a sufficient literature research, which, from my point of view, contains all the essential chapters thematically focused on the problem being addressed. Two series of latexes differing in anionic emulsifier type (non-polymerizable and polymerizable) were synthesized using emulsion polymerization. An acrylate derivative of sunflower oil, styrene, butyl acrylate, diacetoacrylamide and methacrylic acid were used as starting monomers.

The synthesized materials were characterized by suitably chosen physico-chemical analyzes (coagulum content, particle size, minimum film-forming temperature, storage stability).

Films were prepared from the prepared materials. Their properties were assessed depending on the content and type of bio-monomer used and emulsifier used. Selected properties of surface coatings were also monitored.

#### **Formal preparation of the diploma thesis, its language level and breakdown:**

The thesis is normally divided into a theoretical part, an experimental part, results and discussion, and a conclusion. The theoretical part is extensively devoted to emulsion polymerization, both from the point of view of the input substances and the reaction mechanism. In the experimental part, a list of the used chemicals is given, the synthesis of the latex itself is described, and the performance of all 25 latex analyses is described here too. The results and discussion chapter focuses more on stating and summarizing the results. I would appreciate the student's deeper reflection on the individual results of the analyses, in this chapter. At the end of the work, the student briefly summarizes the results of the work and tries to highlight the successes of the synthesis itself as well as the positive results of the selected analyses. The literature used contains a sufficiently broad basis for the thesis.

The formal preparation of the thesis is at the normal level expected for a diploma thesis. The work is written in legible and understandable English.

### Topics for discussion:

- ✓ In the experimental part you describe the synthesis of latex systems, why the synthesis of latexes was carried out in an inert nitrogen atmosphere? What results would you expect if the reactions would be carried out in air.
- ✓ In the description of the chemicals used, a list of commercial chemicals is given, it is further stated that the acrylate methyl esters of sunflower oil (AME\_SO) used in the synthesis of latex were synthesized at the laboratories of the Department of Physical Chemistry and the Institute of Macromolecular Materials of the University of Pardubice. Did you also carry out this synthesis directly or were you present at it? Could you describe the synthesis of these substances? Alternatively, what methods were used to verify their purity, since the product was subsequently used as input raw materials for the synthesis of latexes.
- ✓ Can you explain the term Krafft temperature.
- ✓ The student states that during the test to determine the degree of polymerization conversion, the sample was dried once at a temperature of 105 °C, the second time at a temperature of 110 °C. Was this temperature essential? Didn't the sample just need to be dried to a constant weight? Is necessary to mention the drying time.
- ✓ Could you characterize the type of pH electrode.
- ✓ Could you deeply described Owens, Wendt, Rabel and Kaelble (OWRK) method, method for calculating the surface free energy of a solid from the contact angle?
- ✓ The thesis describes, performs, and evaluates a respectable number of tests of properties of latexes and their films. Did the student do everything himself?

### Conclusion:

In conclusion, I would like to state that the mentioned comments in no way reduce the quality of this work. MSc. Nicholas Ebukolo has demonstrated the ability to work scientifically, obtain and interpret information. The diploma thesis of this focus is beneficial for practice.

In my opinion, the submitted work meets the requirements for a diploma thesis and **I recommend it for defence.**

I grade the work **B**.

Ing. Mgr. Bc. Radka Kopecká, Ph.D.

