

ERASMUS PROGRAMME

TRAINING AGREEMENT and QUALITY COMMITMENT

I. DETAILS OF THE STUDENT

Name of the student: Damla AYDIN

Subject area: Chemical Engineering

Academic year :2011-2012

Degree : B.Sc.

Sending institution: Afyon Kocatepe University

II. DETAILS OF THE PROPOSED TRAINING PROGRAMME ABROAD

Host organisation: University of Huelva-Spain

Planned dates of start and end of the placement period: from June 27th 2012 till September 27th 2012 , that is 3 months

- Knowledge, skills and competences to be acquired:

The Erasmus student will be trained in the following tasks related with the research project:

1. Development of new thickener agents of oil media through functionalization of biopolymers with reactive isocyanate compounds.
2. Optimization of gel-like dispersion formulations based in oil media (vegetable oils) and the new biopolymers synthesized.
3. Characterization of biopolymers and resulting gel-like formulations. Special interest will be paid in the rheological characterization of these oleogels.

- Detailed programme of the training period:

In line with different public directives, which promote both the replacement of non-renewable raw materials by renewable resources and the minimization of the environmental impact caused by industrial waste materials, the main objective of this project is the development of new environmentally-friendly thickener agents for biodegradable lubricating grease formulations and bio-based polyurethanes for biodegradable adhesives and coatings, by chemically modifying natural biopolymers. Different chemical derivatives of the two main natural biopolymers, cellulose and chitin, are proposed to replace the traditional thickener agents based on metal soaps and polyuria in lubricating greases and non-renewable solvents and polyol resources in coatings and adhesives. These new thickener agents must provide a stable gel-like dispersion in the oil medium, with specific functional properties and rheological response. This can be achieved by promoting chemical reactions between the biopolymer and the vegetable oil intended to be used as base lubricant or the solvent source of polyols. As a result, these new products could be potentially competitive with traditional greases, adhesives and coatings. The molar ration between the polyol source and isocyanate-based compounds will determine the application as a lubricant, adhesive or coating. A full rheological and microstructural characterization of these formulations will be carried out, including the study of thermal effects. In addition to this, mechanical and oxidative stability, physical stability against phase separation, as well as thermal degradation will be evaluated, with special attention to the characteristics of the new bio-thickeners developed, i.e. molecular weight and type and degree of chemical modification achieved.

- Tasks of the trainee:

The first task of the trainee will be preparation of functionalized biopolymers. She will carry out the functionalization reaction, purify the final product and perform the chemical characterization of isocyanate functionalised biopolymers.

The second task of the trainee will cover preparation of gel-like dispersion. She will do optimisation experiment and characterise the dispersion by using rheological measurements.

- Monitoring and evaluation plan:

Monitoring and evaluation will be directly taken by the professor coordinator and his research group.

