COMPARATIVE STUDY ON THE RHEOLOGICAL BEHAVIOUR OF SOME INDUSTRIAL ECOLOGICAL LUBRICANTS

Iuliana – Marlena Prodea[1], Nicoleta Teodorescu[2], Mariana-Florentina Ştefănescu[3], Ancaelena Eliza Sterpu[4], Cyrille Alode Vodounon[5]

[1,2,3]*POLYTECHNIC University of Bucharest, Faculty of Mechanical Engineering and Mechatronics, Department of Equipment for Industrial Processes, 313 Splaiul Independentei, 060042 Bucharest, Romania, improdea@yahoo.com*
[4]*OVIDIUS University of Constanta, 124 Mamaia Street, 900527Constanta, Romania.*
[5]*Universite de Parakou, BP:316, Fidjrosse, Cotonou, Benin*

Abstract: *In this paper is analyzed the rheological behaviour of* some *ecological lubricating greases - produced on base of vegetable oils- potentially applicable in the food industry (manufacturing equipment, packaging etc.). The aim is to evaluate, based on the rheological experimental determinations, the lubrication ability of studied greases.*

Keywords: *ecological lubricating greases; rheological behaviour; cone and plate rheometer*

1. Introduction

By the environmental protection regulation, imposed in EU, it is necessary to meet a number of criteria for the lubricants used for equipment in: agriculture, sea environment working, food, drugs or textile industry. There are taken into account the potential risks of water, soil or raw materials contamination. Due to their properties, the greases are the recommended lubricants for applications in the mentioned cases (while the oils are not indicated at all). The consistency, the stability during work and the lubricating capacity are the main parameters on which the grease is chosen.

The scientific researches of the last 10-15 years, on the greases composition and behaviour, had as target the development of new products with a minimum environmental and human health impact. In the same time the greases must effective (of highest required quality) (Refs. [1-9]).

So there were replaced the minerals oils with vegetable ones, which are not at all toxic and are biodegradable.

The paper presents a comparative study, from rheological properties point of view, between some biodegradable greases (potentially applicable in the food industry), prepared in the OVIDIUS Constanta University laboratories, based on an original recipe. The rheological behaviour experiments were done in the Applied Rheology Laboratory of the Industrial Process Equipment Department from University POLITEHNICA of Bucharest.

2. Experimental research

The experimental studies were done on the following lubricants: biodegradable greases, additivated or non-additivated, corn, palm and soja oil based, having as thickening agent a calcium stearate soap, who's concentration varies between 15-25%. The calcium stearate soap is considered an environment-friendly product, compared with the other metallic soaps.

The additives used are natural polymers: cellulosic derivatives and lignin, so the