PERFORMANCE ANALYSIS OF OIL OF CASHEWNUTS AS LUBRICANT

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Abstract: *Responsible for reducing the wear related to the friction, protect the metal against oxidation, corrosion, and dissipate excess heat, the lubrication is essential to the balance of a mechanical system, prolonging the life of the machine. Vegetable oil is a renewable resource which has in their use environmental, social and economic advantages. Especially in these days, which seeks an alternative to meet the future demands of the common lubricants based on petroleum. In recent researches, it was proven as satisfactory the physic-chemical properties of cashew nut oil (OCC) and are comparable with those from the mineral oil SAE 15W40 API SL. In this context, we developed a project to analyze its performance as a lubricant. It was built a test system able to simulate the dynamic contact of the inner parts of an internal combustion engine with constant lubrication. On this testing methodology, we considered the temperature variation of the system, so that, on the end was obtained the relative thermal history. The temperatures near the contact and the environment were measured using thermocouples attached to the testing device and recorded for control and monitoring of parameters during the tests. The study was complemented by tests of shape-shifting and mass measurement. So, depending on the wear originated on the parts, itôs possible to give an opinion comparing the cashew nut oil and the mineral oil SAE 15W40 API SL used in the tests.*

Keywords*: cashew nut oil; mechanical system; lubricant.*

1. INTRODUCTION

The importance given to blood for the functioning from human body is the same as the lubricant for a mechanical system, its function is to reduce wear on the friction, protect the metal from rust and corrosion, and dissipate the heat; their misuse, absence or poor quality can cause serious damage that could jeopardize all or part of the system.

The origin of lubricating oils, is generally, mineral being extracted from petroleum or synthesized and their classification is based on their physicochemical properties.

Starting from call clean engineering, was checked the need for a biodegradable product that is economically and technically feasible. For this, we if preferred to work with the oil of cashew nut as raw material, this to be abundant in this region of western Potiguar.

Using the method of pressing for the extraction of oil and with cashewnuts pre-heated up to 60 º C, the average yield of cashewnut oil is about 45.7%, second (Lima, et al 2004). However cashew nut oil used in this article was not preheated, his because same as the warming may alter its physico-chemical, so it is in natura, Fig. (1).

Knowing the physicalchemical properties of cashew nut oil it was found that have some parameters next close to another existing oil in the market 15W40. But as the intensive properties can not be the single parameters to be considered, this paper analyzed the performance of two fluids in a test bench for dynamic tests to with that analyze the wear on it.

Figure 1- Oil sample.

2. METHODOLOGY

To realization the test from relative wear, a abrasion tribometer adapted from a vise was used for the tests abrasive. The scheme consists of a cylindrical part of the revolution, which slides in contact with another piece with similar characteristics, but this last remains static and the contact between them is generated from a load of 4.75 N. At the same time in wich the oil is dripped at a rate of a drop / mim on the surfaces in contact. See Fig (2):

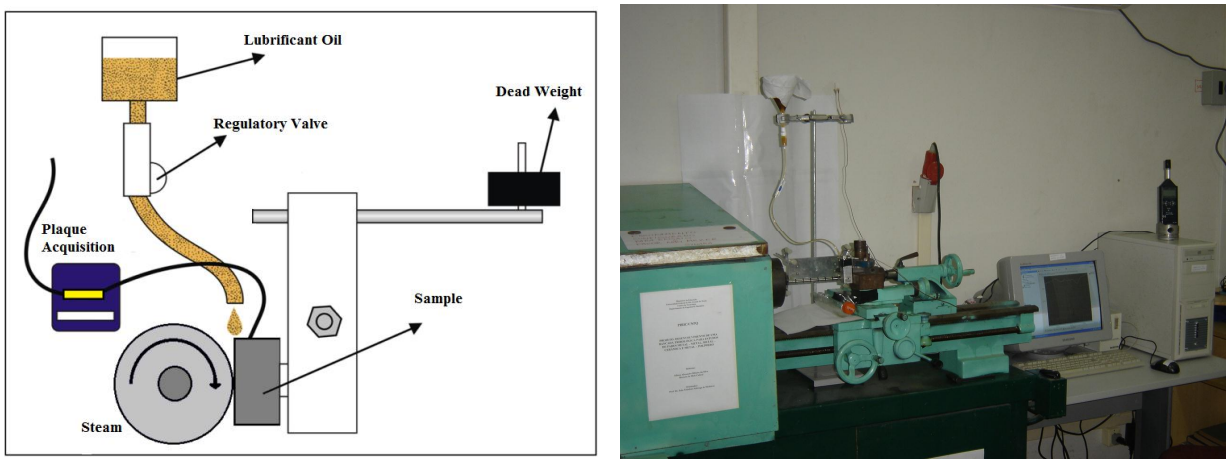

Figure 2 ï Schema Abrasion System.

For confection of the specimen was originally planned to use the same metal used in the manufacture of internal combustion engines. However, these are made of an alloy complex, choosing then to use the ASTM 1045 to make specimens (diameter: 12.5 mm, length: 25mm), and ASTM 1045 steel quenched and tempered in rods (diameter : 12mm, Length: 250mm). For this test were prepared ten samples (A1, A2, A3, A4, A5, A6, A7, A8, A9 and A10) and two rods (H1 and H2) all with the same dimensions, Fig.(3).

To workmanship the surfaces of the samples was used sandpaper sizes grit Sic in the following: # 100, # 240, # 320, # 400, # 600, and in the stem # 100 and # 240. After sanding, they were subjected to ultrasonic bath, drying and measuring their masses in a precision balance.

The test for 15W40 oil analysis was performed using the H1 stem, and the samples A1, A2, A3, A4 and A5, forming pairs H1A1, H1A2, H1A3, H1A4 and H1A5, Fig (4).

The test for analysis of the OCC was done using the stem H2, and the samples A6, A7, A8, A9 and A10, forming pairs H2A6, H2A7, H2A8, H2A9 and H2A10.

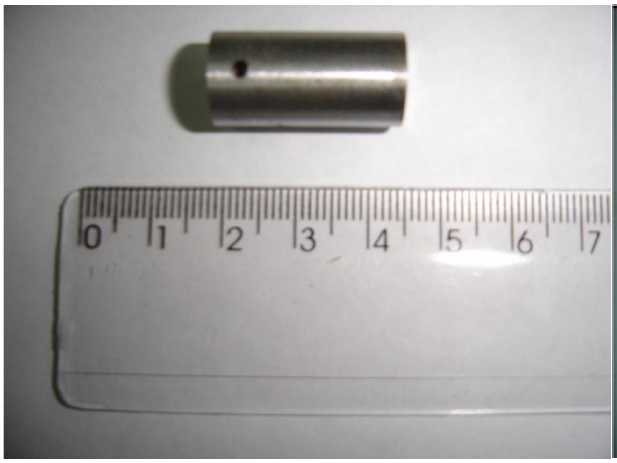

Figure 3 ï Sample**.**

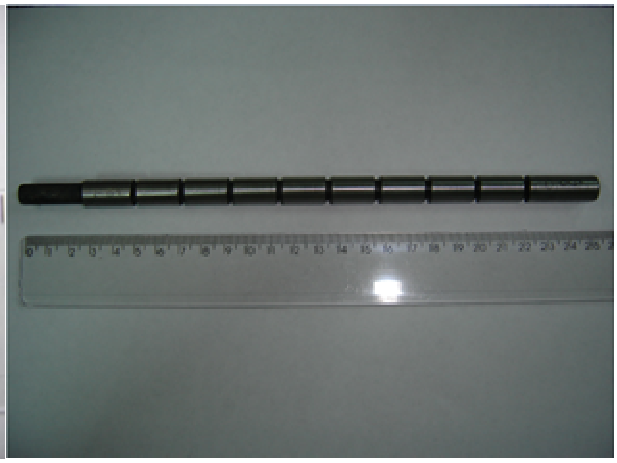

Figure 4 ï Stem.

3. RESULTS AND DISCUSSIONS.

In an abrasive test one of parameters analyzed was the temperature, since heat dissipation, as mentioned previously, is one of the functions of a lubricant. In Fig (5), which shows the temperature variation between each sample and the

environment, can be seen that in parameters temperature the cashew oil nut played a better role than commercial oil 15W40. For greater precision, it was found the temperature every second during the test period.

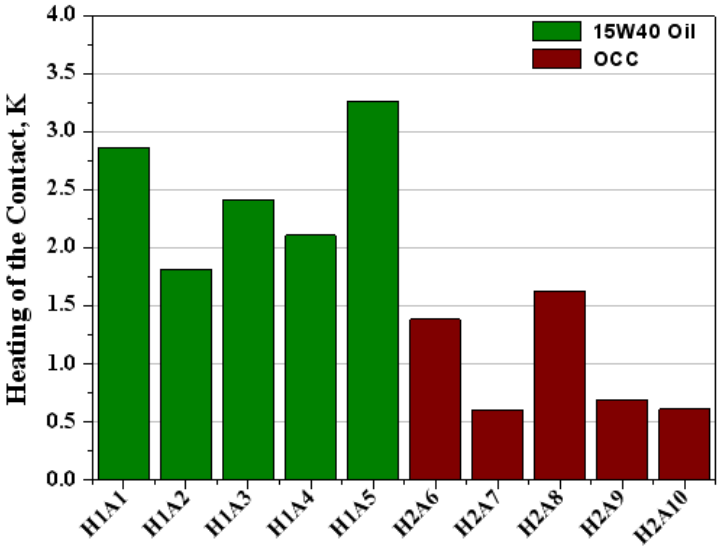

Figure 5 ï Grafic from Contact Heating.

The results of the wear rate was obtained by difference in mass of the samples weighed before and after the tests. Based on Fig (3), the wear rates were lower for oil 15W40. A likely explanation for this high level of wear may be function of physicalchemical properties of oil (eg, index of acidity) and the presence of impurities or particle remnants of the process of oil extraction.

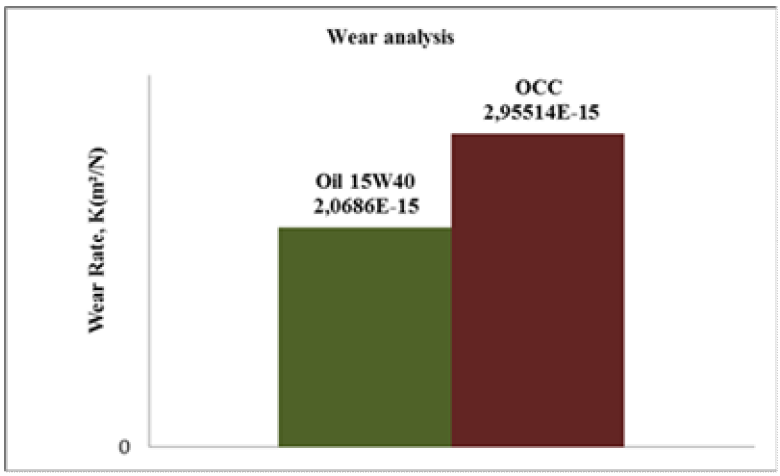

Figure 6 - Grafic Wear Rate.

4. CONCLUSION

Based on the analysis of results, the oil of cashew nut when compared with the SAE 15W40 has a high wear rate, not allowing, in principle, his appointment as lubricating oil even though he has shown satisfactory performance as to heating of contact.

In this sense, a more detailed analysis of the chemical properties of the OCC is necessary to optimize their use, assessing the influence of additives on performance.

5. REFERENCES

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6. RESPONSIBILITY NOTICE

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