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Research Highlights

Formulation of High Performance, Multipurpose Grease using Gypsum from Titanium Dioxide Manufacturing Waste (From Waste to Wealth)

Abstract

1. GREASES

- The use of liquid lubricant generally requires sealing of bearing against loss of lubricants.
- This sealing problem can often be simplified if lubricants are employed which resist the deforming effect of gravity. Such "solidified" lubricants are usually called "greases", and are mostly composed of lubricating oil, which would normally have been employed, together with a gelling agent, which lends stiffness to the mixture.
- Grease, as a rule, is a viscous plastic product, which adhere strongly to the packing material. Grease consists of two basic structural components: a thickening agent and liquid or base fluid, in which that thickening agent is dispersed. Many types and combination of thickener and base fluids, along with supplemental structure modifiers and performance additives, give final grease formulation their specialty



2. GYPSUM

The gypsum used in the present investigation is one of the major wastes from the titanium dioxide formulation manufacturing in Malaysia (titanium dioxide). One of the major facilities for the production of the gypsum produces 500,000 ton/year of that waste and stores it in an opened piece of land because the cost of treating such waste is very high. The cost of treating one ton of the waste gypsum in Malaysia is about 800 to 3000 RM per ton (kualiti alam) which is considered to be costly for the industrial application

Impact towards the Country and Society

The success of such project has great benefit to the country. This novel work could solve the pollution problem of one of the major companies in Malaysia where massive amounts of wastes "red gypsum wastes" are stored in large pieces of land because of the high cost of the treatment of such wastes. The present invention converts the negative cost of treating the red gypsum wastes to positive income to the industry by converting the wastes to valuable product like grease. The formulated grease can be used in most of the machinery industries such as the

automotive industries (cars, air planes and ships manufacturing) which means cost saving and a new cheap, available and easy to formulate.

Results

The shape of the grease is further examined with scanning electron microscopy (SEM). SEM was examined at a magnification of 100x, 200x, 700x and 1000x. The dispersed fume silica particles are of the order of less than 10 micron in length and width. It was to note that grease properties are not only dependent on the composition of the lubricant but also on the size and configuration of particles of the

thickening agent. The results of this scanning technique are shown in figure (1 to 3)

From the photos taken by the microscopic tests from this test, we can determine the homogeneity of the grease. The homogeneity gives the important effect to the grease in order to work effective and efficiently. If some grease not homogeneous, it will become cluster and bulk. These conditions will reduce the effectiveness of the grease such as the roughness of the surface cannot be smooth after covered with the grease. The result shows the good homogenous that produced from the dispersed of the fume silica.