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INTRODUCTION

One of the major concerns has been the disposal of by-products generated during the regeneration of the used transformer oil by turning problematic waste products into saleable. Egypt is now faced with enormous problems of environmental protection, a continuous decrease in petroleum reserves and the ever increasing demand for energy.

Transformer oil represents today, one of the most important of a long series of petroleum specialty oils. This oil serves as a dielectric and coolant medium in transformer units. In performing these functions, the oil gradually deteriorates by oxidation and picks up moisture. If the free moisture content rises above a certain level, its insulating efficiency deteriorates and arcing therefore may occur deteriorate. As the result, asphaltenic materials precipitate and deposit on the core and in the transformer cooling coils; thus giving bad insulating and cooling.

Reclamation of the used transformer oil eliminates insoluble and dissolved contaminants to attain oil with characteristics similar to those of new oil. Clay is used in the refining step of the used oils to improve their color and to remove asphaltic and resinous materials. The refining action of the clay depends on its nature, method of application and treating.

The cement industry produces a large amount of waste dust. This dust arises from two sources. Firstly, cement dust from the rotary kiln, known as kiln dust, that settles from the electrostatic precipitation used to purify the flue gases evolving from the kiln; and secondly, by-pass dust, which constitutes a "purge" from the kiln in order to minimize the amount of alkalis in the effluent flue gases from the kiln. The first type can usually be recycled to the kiln since its alkali content is usually low. By-pass dust, on the other hand can not be recycled to the kiln, its alkali content usually exceeding 10%. The rate of by-pass dust production usually ranges from 3 - 8% of the kiln production rate. A capacity of 4000 ton/day clinker will produce about 200

ton/day by-pass dust. This large amount has to be disposed, which represents an environmental hazard, primarily because of its extremely low particle size about 10 microns.

In this thesis, an approach for the regeneration of waste transformer oil by using acid/by-pass kiln dust cement was achieved. Different ratios of sulphuric acid and by-pass kiln dust at various mixing times were investigated. The chemical composition of cement kiln dust was determined.

The physicochemical and electrical properties of waste transformer oils and recycled samples were studied according to standard methods of analysis including structural group analysis, infrared spectroscopy and capillary gas chromatography. In addition, the distribution of the hydrocarbon components for oil before and after treatment oils was performed using capillary gas chromatography. The AC breakdown voltages (BDV) and dissipation factors were determined for used transformer oils and recycled samples according to the ASTM standard tests D877 and D150.

Therefore, the present study program encompasses three main phases: The first phase deals with the laboratory treatment of the used transformer oil with different ratios of sulphuric acid at different time mixing in order to determine the most efficient condition. In the second phase, the physicochemical properties of transformer oils and recycled samples, in addition to the AC breakdown voltages (BDV) were determined. In the third phase, the possibility of using the by-pass kiln dust to solve pollution problem, for the reclamation of waste transformer oil, was investigated.