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METHOD OF DESULPHURIZING OILS

Edwin M. Nygaard and Orland M. Reiff, Woodbury, N. J., assignors to Socony-Vacuum Oil Company, Incorporated, New York, N. Y., a corporation of New York

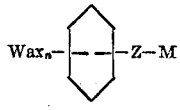
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2 Claims. (Cl. 196—30)

This invention has to do with the chemical refining of petroleum oil fractions, particularly those light oils such as gasoline and naphtha fractions, containing mercaptans, gum forming materials, and other deleterious compounds.

This invention has for its object the utilization in such processes of novel reagents of a class not heretofore used for such purposes.

It is based on the discovery that effective use may be made of compounds of the general type,



where



denotes a mono- or polycyclic aryl nucleus, where "wax" denotes a heavy alkyl substituent, having 20 or more carbon atoms, such as may be derived from paraffin wax, and n is the number of such substituents, where M is a metal, and Z represents either a direct bonding of the metal to the aryl nucleus by substitution for a nuclear hydrogen or a linkage of the metal to the aryl nucleus through an intervening oxygen atom, as in a phenate. Of these there are preferred the wax substituted phenates of the metals of the copper, tin, aluminum, and iron groups, using those terms as they are used in analytical chemistry to denote the sulphide forming metals.

These reagents are discussed in detail in the application of Orland M. Reiff, Serial Number 22,755, filed August 8, 1938, now U. S. Patent No. 2,197,835, and the methods which may be used in their preparation are there given in detail. In general, the method of preparation may be described as that of conducting a Friedel-Crafts type of reaction to obtain the wax substitution, as to obtain a tetra-wax phenate, after the method discussed in U. S. Patent 2,191,499 to O. M. Reiff, and then bringing about the replacement of the hydroxyl hydrogen by the desired metal. These compounds are oil soluble and relatively non-volatile at the distillation temperatures of gasoline and similar light petroleum fractions. Of these compounds we prefer those capable of ready reaction to form sulphides not highly soluble in oil, and particularly the compounds of copper, lead, aluminum and iron.

A convenient method of applying these reagents consists of heating together the oil and the reagent for a time sufficient to bring about the desired reaction, followed by distilling the treated gasoline out of the reaction mixture, leaving reagent and reaction products behind. In the usual case, when sour distillate has been so treated, the distillate needs further sweetening, as by the usual doctor treatment. However, it will be plain from the experimental evidence set forth below that the process disclosed herein has a desirable refining capability.

In the following example, two sets of data are given, in each of which a cracked gasoline was first heated, under refluxing conditions, with about two percent of its weight of wax substituted aluminum phenate for a period of three hours, after which the gasoline was distilled from the reaction mixture and doctor treated. The tabular data compares the result with the result of conventional doctor treatment of the cracked gasoline.

Example I

	Treatment with phenate	Treatment without phenate
Distillation:		
I. B. P.	120	103
10%	171	157
50%	261	258
90%	338	337
E. P.	(98%) 370	(97.5%) 364
Gravity A. P. I.	57.7	57.8
Total sulphur	0.025	0.030
Octane No. (clear)	62.0	62.0
Octane No. plus 1 cc of TEL/gal.	72.2	71.7

Example II

	Treatment with phenate	Treatment without phenate
Distillation:		
I. B. P.	118	108
10%	170	161
50%	272	269
90%	354	352
E. P.	(98%) 392	(97.5%) 390
Gravity, A. P. I.	54.3	55.2
Total sulphur	0.175	0.199
Copper dish gum	47; 38	236; 269

It will be seen that the treatment described effected improvements of commercial significance in the gasoline treated, in that sulphur and gum forming tendencies were markedly reduced, without at the same time decreasing the susceptibility of the gasoline to increase of octane number by the addition of like amounts of tetra-ethyl lead.

We claim:

1. That method of removing sulphur from gasoline comprising reacting the sulphur compounds therein with a wax substituted metal phenate and separating out the resulting reaction products.

2. That method of removing sulphur from gasoline comprising reacting the sulphur compounds therein with a wax substituted metal phenate selected from the group consisting of copper, lead, iron, and aluminum phenates and separating out the resulting reaction products.

EDWIN M. NYGAARD.
ORLAND M. REIFF.