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PROCESS OF DESULPHURIZING HYDROCARBON OILS

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3 Claims. (Cl. 196—24)

This invention relates to methods of making chemical mixtures, and comprises a process of making a highly reactive chemical mixture, which, if added to hydrocarbon oils and the combination heated under pressure, combines or reacts upon the sulphur compounds in the hydrocarbon oils so treated in such a manner that gaseous sulphur compounds and water soluble sulphur compounds are formed which may be easily eliminated, resulting in a distinct improvement of the hydrocarbon oil under treatment.

We have discovered that when certain solid and liquid chemicals are combined, and added in proper proportions to liquid hydrocarbons, then heated under pressure, and subsequently cooled, such chemical combination has the characteristic of becoming completely absorbed by the liquid hydrocarbon, and in such manner that the sulphur compounds contained in the liquid hydrocarbon are converted and may be easily removed. We have also found that, by use of this chemical mixture, all the ingredients used in said mixture, each of which is known to be beneficial in the treatment of hydrocarbon oils, are completely absorbed into the oil incident to the heat treatment under pressure. This is of distinct advantage in that there is no waste in unabsorbed chemicals, and is also a distinct departure from the use of certain chemicals which are used to react upon hydrocarbon oils catalytically.

Ordinarily in treating hydrocarbon oils for desulphurizing, catalytic metals or salts are used, but we have found by the use of the combination of chemicals herein cited that they are completely absorbed into the oils being treated, although several of the chemicals used in said combination are not normally soluble in liquid hydrocarbons. By our combination we have discovered that by heating under pressure, each of the ingredients, all beneficial to the treatment of hydrocarbon oils, combine easily by solution or dissociation into the hydrocarbon oil under treatment, and have the added attribute of reacting upon sulphur compounds in such a manner that they are easily removed both in gaseous form and by simple water wash without the use of caustic or acid.

The process of sulphur removal is therefore much simpler and cheaper than are the methods in common use wherein a portion only of the sulphur compounds in the oil is removed by alkali or acid washes.

By experiment we have found our mixture effective for sulphur reduction upon hydrocarbon oils of many varieties, such as crude petroleum oil, residuum oil, tar-oils, shale oil and various pyrobitumens.

We have found that a mixture such as ours, of high reactivity with the sulphur compounds of hydrocarbon oils can be prepared by using in the following proportions the following easily obtained chemicals:

For each gallon of hydrocarbon oil processed, add:

Ferric chloride ($FeCl_3$)	grams	40
Arsenic acid (As_2O_5)	do	8
Napthalene	do	8
Barium chloride	do	4
Alcohol (methyl or ethyl)	cc	100
Benzol	cc	40
Alum	grams	4

Other forms of arsenic and barium may be substituted for those given above, such as arsenic chloride, arsenic chloride ammonium, arsenic trifluoride, arsenic diiodide or triiodide; or barium bromide, barium hydroxide, barium iodide and barium oxide.

In preparing the mixture, we prefer to dissolve the naphthalene and ferric chloride in the alcohol and benzol solution, then to mix this combination with the oil to be treated and the dry ingredients arsenic, alum and barium added thereto.

Although the proportions given above are cited as an example for treating petroleum containing sulphur compounds to the extent of 5%, the proportions so cited are not arbitrary, as the various ingredients may be changed and varied as to weight and volume in ratio to the sulphur content of the oil under treatment, although the chemical combination should be retained as to the chemicals used.

It has been found also that the amount of chemical per unit of oil treated may be varied to procure the desired desulphurization with oils of varying sulphur content.

The mixture after preparation as cited above is added to the oil to be desulphurized, thoroughly mixed by suitable means, the mixture placed in any suitable vessel wherein the temperature and pressure may be raised in the absence of air. After such heating, it will be found that sulphurated hydrogen and sulphur dioxide in large volume will be given off the treated oil upon release of the pressure back to atmospheric pressure.

The treated oil may be further purified by

washing with water in suitable equipment and thence distilled into valuable hydrocarbon oils, substantially free of sulphur compounds, without prior treatment of alkalis or acids.

Having thus described our invention, what we claim as new therein and desire to secure by Letters Patent is—

1. The process of desulphurizing hydrocarbon oils comprising mixing with a quantity of oil a treating mixture comprising ferric chloride, arsenic acid, napthalene, barium chloride, alum, alcohol and benzol, and then heating the mixed oil and treating mixture under pressure.

2. The process of desulphurizing hydrocarbon oils which comprises adding to each gallon of the oil a mixture comprising the following substances, substantially in the amounts specified: ferric chloride, 40 grams; arsenic acid, 8 grams; napthalene, 8 grams; barium chloride, 4 grams; alcohol, 100 cc.; benzol, 40 cc.; alum, 4 grams, and heating the mixture under pressure.

3. The process of preparing a mixture for use in the desulphurization of hydrocarbon oils which comprises mixing together ferric chloride, arsenic acid, alum, barium chloride and napthalene by solution and combination with alcohol and benzol.

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