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PROCESS FOR REMOVING ACIDS FROM
HYDROCARBONS

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This invention deals with an improvement in processes for extracting weak acids from hydrocarbons. More particularly, it is concerned with a method for improving the rate of separation of alkaline extracting solutions from gasolines or for facilitating steam stripping the resulting spent alkaline solution, if the latter is desired, or both.

It is known that gasolines frequently contain weak acids such as those having dissociation constants below about 10^{-5} , e. g. H_2S , mercaptans, alkyl phenols, etc., which acids must be removed for various reasons. A number of processes have been developed for extracting these acids. All of these processes have in common the step of treating the hydrocarbon oil containing the acid with an alkaline solution, and thereafter separating the hydrocarbon oil from the resulting alkaline solution containing salts of the absorbed acid. For reasons of economy, the resulting spent alkaline solution is usually regenerated, steam stripping in general being the preferred method of regeneration. The regenerated solution is then used for the extraction of further quantities of acids from hydrocarbons containing them.

Examples of particular processes for the extraction of weak acids normally associated with petroleum oils are: processes involving the extraction of H_2S from gaseous or liquid hydrocarbons by use of aqueous solutions of tripotassium phosphate, sodium phenolate, sodium borate, sodium or potassium carbonate, organic bases such as ethanolamine, diamino propanol, piperidine, etc.; processes involving the extraction of alkyl phenols from hydrocarbon distillates with solutions of alkali metal hydroxides, preferably having concentrations of about 25–50%; and processes involving the extraction of mercaptans with so-called solutizer solutions by the solutizer process, etc.

In the solutizer process, a sour gasoline distillate containing mercaptans is extracted with an aqueous caustic alkali solution containing one or several solutizers or solubility promoters for mercaptans. Suitable solutizers are, for example, alcohols such as methanol, ethanol, propanol, etc.; aliphatic alkanolamines and amino alkyl amines in which the alkyl radicals contain 2 or 3 carbon atoms; diamino alcohols, glycols and amino glycols of 3 to 5 carbon atoms; alkyl glycerines in which the total number of carbon atoms in the alkyl radicals is from 1 to 4; monomethyl glyceryl ether; diamino, dihydroxy or amino hydroxy alkyl ethers or thioethers in which the alkyl radicals have from 2 to 3 carbon atoms;

alkali metal salts of fatty acids having from 3 to 5 carbon atoms; or, in the case of potassium salts, having from 1 to 6 carbon atoms; amino or hydroxy fatty acids having from 2 to 7 carbon atoms, phenyl acetic acid, hydroxy or amino phenyl acetic acid, alkyl phenols, etc.

It is known that among the many solutizers which are employed to promote solubility of mercaptans in strongly alkaline aqueous solutions, the alkali metal alkyl phenolates aid in the production of sweet gasolines of reasonable oxidation stabilities. This phenomenon, which has been described in the Yabroff-White Patent 2,223,798, is due to the fact that while mercaptans are extracted from the sour gasoline substantially completely, natural gum inhibitors, i. e. alkyl phenols normally contained in the gasolines, are only partially extracted, an alkyl phenol equilibrium being established between the gasoline and the extracting solution. Therefore, it is very often advantageous to employ for the extraction a solutizer solution to which a certain amount of alkyl phenolates is added. Many gasolines, and more particularly almost all cracked gasolines, contain alkyl phenols, at least a portion of which will accumulate in the solutizer solution. Inasmuch as the solutizer solution is continuously circulated from an extracting stage to a steam regeneration stage and back to the extraction stage, even traces of alkyl phenols contained in the gasoline will eventually build up in the solutizer solution until the concentration of the alkyl phenolate in the solutizer solution is in equilibrium with the concentration of the alkyl phenols in the incoming gasoline. It has been found that in spite of thorough caustic alkali pretreatment, the incoming gasoline may contain enough alkyl phenols to establish over an extended period of operation an equilibrium concentration of anywhere between about 3 and 20% alkyl phenolates in the solutizer solution, even though the original treating solution may have been free from phenolates.

Aqueous solutions containing substantial amounts of alkyl phenolates are not advantageous because they have a tendency to form emulsions which separate slowly. It has been found in the past that in order to avoid emulsion troubles the concentration of the alkyl phenolates must be kept below certain limits, otherwise more or less permanent emulsions may form (U. S. Patent 2,202,039).

It has further been found that alkaline solutions which are used for extracting weak acids from hydrocarbon oils of the gasoline range as

described above and which are thereafter regenerated by steam stripping, may gradually accumulate substances which act as emulsifiers and foam inducers. In general, processes dealing with the removal of H_2S are troubled primarily with foaming, whereas the processes dealing with the extraction of mercaptans, phenols, etc., frequently are subject not only to foaming, but also to the formation of stubborn emulsions which reduce the rate of separation.

As a result, maximum throughput through an extraction unit of a given size may be greatly reduced, or else the use of large settlers or of centrifuges may be required. Likewise, the capacity of steam strippers may be greatly curtailed.

The nature of the substances responsible for foaming and emulsion difficulties is not definitely established. It may be that a substance is involved which is related to the gums that form in gasolines due to oxidation or it may be due to resinous materials formed as by interaction of some of the components of the gasolines (possibly impurities) with the alkaline treating solution or a component thereof. For example, it is quite possible that in the case of solutizer treatment with solutions containing phenolates, a phenol type resin is formed, for instance by interaction with mercaptans, aldehydes or other impurities. Such a possibility is supported by the fact that solutizer solutions containing phenolates have in the past given the greatest difficulties.

Accordingly it is a purpose of this invention to provide means for improving the rate of separation of aqueous alkaline treating solutions from gasolines which are being treated. Another purpose is to reduce the foaming which occurs during regeneration of the treating solutions by steam stripping. Still another purpose of this invention is to provide means for preventing the formation of emulsions caused by the presence of accumulated emulsifiers in solutizer solutions, particularly in those containing alkyl phenolates; and it is yet another purpose to break emulsions formed by gasolines in solutizer solutions.

This invention comprises maintaining in an aqueous alkaline treating solution small amounts of two substances: (1) a water-soluble surface active alkali metal salt of an organic sulfonic or sulfate ester acid; and (2) a mineral oil, which combination is added to reduce emulsification and foaming between gasolines and the solution. The term "surface active" as herein used refers to the ability of the salt to reduce materially the surface tension of pure water when added thereto in small amounts, that is, in amounts of a few tenths of one percent. The term "water-soluble" is not limited to substances which form true solutions but includes substances which spontaneously form colloidal solutions or dispersions as well.

In order that these two substances which are added to the aqueous alkaline treating solution may be more or less permanently useful in a regenerative process wherein said solution is continuously regenerated and recirculated for further extracting gasolines containing weak acids, it is desirable that these substances have a number of definite properties. The required properties of the surface active salts (1) will be discussed first.

The types of organic sulfonic and sulfate ester acids which produce these surface active salts, as well as their methods of manufacture, are generally well known. The particular class of these

salts preferred are those which are free from carboxyl radicals, contain at least 10 carbon atoms per molecule, and have a molecular weight below about 1000. Such salts have been found particularly effective in the breaking of emulsions which may form between gasolines and the treating solution, and also have some effect in preventing foaming.

Another necessary property of the salt is that it be soluble or colloiddally dispersable in effective amounts in the aqueous extracting solution; for example, when applied to the solutizer process, soluble in an aqueous solution containing caustic alkali in a normality of at least about 2 and, in addition, containing substantial amounts (e. g. normally 15% or more) of the solutizer or solutizers such as alkali metal phenolates and other solutizers described above.

Further, the active salts should not be extracted from the solutizer solution when the latter is in contact with the gasolines. The presence of alkali metal salts of sulfonic or sulfate acids in gasoline adversely affects many of its properties, e. g. its stability, A. S. T. M. gum, copper dish gum, color, etc. Therefore it is desirable that the salts be substantially insoluble in hydrocarbon oils, after being wetted by water, although they may be and often are soluble or colloiddally dispersable in hydrocarbons when wetted by the latter.

Furthermore, the salts should be reasonably stable toward the action of small amounts of oxygen in the presence of strong caustic and at the elevated temperatures of steaming which are necessary in the regeneration step. Most hydrocarbon oils of the gasoline range contain small amounts of dissolved oxygen which may have entered during storage or during pumping of the oil. Pumps, particularly those of the rotary type, unless specially protected usually suck in some air through the packing glands, and this air is then dissolved in the oil being pumped.

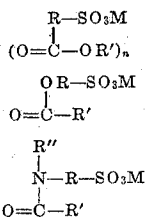
In some few instances, it may become desirable to remove the surface active salt from the extracting solution, in which case it should have a property which makes possible such separation. In most instances the removal can be accomplished relatively easily by adding small amounts of lime water or other hydroxide or water-soluble salt of a polyvalent metal to the extracting solution, polyvalent metal salts and particularly the calcium salts of most organic sulfonates and sulfates of this invention being insoluble in the solutizer or similar extracting solutions and being precipitated as a curd which can be settled or filtered out.

Of the two classes of surface active compounds suitable for the purpose of this invention, i. e. the alkali metal salts of sulfonic acids and sulfate ester acids, the former are preferred as being in general more resistant to hydrolysis. Resistance to hydrolysis in the presence of free caustic alkali and under the conditions of steam regeneration is an important property when it is desired that the effect of the surface active salts be more or less permanent.

Suitable sulfonates and sulfates may, if desired, contain non-functional radicals such as halogen, hydroxyl, ether, amino, imino, hydrosulfide, sulfide, carboxyl ester, etc., radicals.

Specific sulfonates which we have found to be suitable herein are the water-soluble alkali metal salts of, for example: petroleum sulfonic acids such as the salts of "green acids" produced in the manufacture of medicinal oils by acid treatment;

the products of treating kerosene or lube oil extracts with concentrated sulfuric acid; various aliphatic or alicyclic sulfonic acids such as fatty sulfonic acids, fatty aromatic sulfonic acids, naphthene sulfonic acids; sulfonic acids of various aromatic hydrocarbons, such as various alkylated benzenes, diphenyls, xylenes, diphenyl methanes, naphthalenes, anthracenes, phenanthrenes, tetralines, alkyl phenols such as those contained in cracked petroleum distillates, alkylated chlornaphthalenes, naphthylamines, diphenyl oxides, chlorinated diphenyl oxides, sulfides or amines; alkylated pyridines, quinolines, isoquinolines, pyrroles, pyrrolidines, piperidine, thiophenes, thiophanes, etc.; or various sulfonic acids of carboxylic acid esters or amides, such as the ester sulfo-carboxylic acids or sulfonate amides having the general formulae:



respectively, wherein the R radicals are organic radicals, such as aliphatic or cyclic hydrocarbon radicals, M is an alkali metal and n is an integer normally not greater than 2.

While the carboxylic acid esters and amides listed above are very effective herein, many of them have the disadvantage of being susceptible to hydrolysis during steam regeneration of the solutizer solution forming free carboxylic acids upon decomposition, the salts of which are likely to cause foaming.

The alkali metal salts of sulfonic acids possessing at least one alkyl radical are in general far more effective than the salts of corresponding sulfonic acids not possessing them. For example, the alkali metal salts of naphthalene or anthracene sulfonic acids are only mildly beneficial, whereas the corresponding salts of, for example, mono- or dibutyl naphthalene sulfonic acids or of retene sulfonic acid are highly effective.

The sulfonates may be prepared in various ways. Aromatic sulfonates are most readily obtained by simply treating aromatic compounds with concentrated or fuming sulfuric acid. Aliphatic sulfonates may be obtained under some conditions by treating olefines or diolefines with concentrated sulfuric acid, or by treating organic acid sulfates with sodium sulfite so as to eliminate sodium sulfate, or by oxidation of mercaptans with nitric acid, etc. Satisfactory sulfonates may also be obtained by treating a lubricating oil with concentrated or fuming sulfuric acid.

Sulfate ester acids of which the alkali salts are suitable herein are, for example: the fatty sulfates, such as mono lauryl, cetyl, stearyl, etc., sulfate acids; mono esters of sulfuric acid obtained by treating with concentrated to moderately concentrated sulfuric acid various olefines or alcohols such as the long chain olefines obtained in the vapor phase cracking of wax at about 1020-1040° F., polymers obtained in the polymerization of normally gaseous olefines with inorganic polyoxy acids or Friedel-Crafts catalysts, fatty or naphthenic alcohols obtained in the catalytic reduction of fatty or naphthenic acids, alcohols obtained by condensation of ketones or aldehydes followed by a hydrogenation; or alkyl

aromatic mono esters of sulfuric acid, etc. A convenient source for many of the active sulfate ester acids is the sludges obtained in the acid treatment of cracked distillates, or the spent acids obtained in the polymerization of olefines, or in the alkylation of isoparaffins with olefines with sulfuric acid.

The amounts of surface active salts which must be added to increase the rate of separation of the emulsion are generally quite small and vary from about .001% to 1% by weight, generally about .1%, of the solutizer solution. Different types of alkaline solutions are capable of dissolving different amounts of the active salts. In general, the presence of alkyl phenolates in the aqueous solution greatly enhances the solvent power for the salts. Preferably the amount added should not exceed its solubility limit in aqueous solution. However, within reasonable limits, the amount of salt necessary is directly proportional to the amount of emulsifiers present in the solution.

It is desirable that the beneficial effect of the salt shall not be restricted to and be dependent on a specific range of concentration substantially narrower than the limits indicated above—that is to say, there should not be a sudden reversal of the beneficial effect, i. e. an increase in the emulsification tendencies of the extracting solution upon addition of a slight excess of the salt over the optimum quantity. On the contrary, the beneficial effects should extend over substantially the entire range of concentration indicated, and changes in the effects due to deviations from the optimum concentration should be only matters of degree. Many surface active salts, particularly the ordinary soaps such as sodium stearate, sodium oleate, etc., while effecting demulsification in certain specific amounts, when present in slightly larger amounts increase rather than decrease the emulsion tendencies of the extracting solution. For example, sodium stearate in a concentration of .06% effectively broke a semi-stable solutizer emulsion, while in a .08% concentration a stable emulsion remained.

It is, however, understood that the beneficial effects of the surface active salts of this invention do not extend to all concentrations thereof. When present in excessive amounts, e. g. in amounts substantially above about 1%, even the best of the active compounds may act as emulsifiers, rather than as settling accelerators or emulsion breakers or both. For this reason it is important that the concentration of the demulsifying agents in the aqueous alkaline solution be limited to within the approximate useful limits indicated.

For the same reason it is essential that the gasoline which is being treated be substantially free from sulfate ester acids or sulfonic acids. Such acid-sulfuric acid derivatives may be the result of a sulfuric acid treatment, and, if present in the gasoline, should be removed prior to subjecting the gasoline to our treating process, as by a pre-scrubbing with dilute aqueous caustic alkali.

The properties of the second of these additive substances—the mineral oils (2)—will now be discussed in detail.

It has been found that in the absence of surface active salts of sulfonic and sulfate ester acids, heavy aromatic oils, e. g. those having high boiling ranges, are the best defoaming agents. However, they are not satisfactory in systems involving the treatment of hydrocarbon oils of the gasoline range, because if even very small

amounts of such oils are extracted by the gasoline they will detrimentally increase the gum content of the gasoline. This detrimental effect is also characteristic of other heavy oils, including heavy paraffinic oils, although only the aromatic oils have any appreciable defoaming properties by themselves. The lighter the oil added the more easily it is lost by extraction and/or stripped out during steam regeneration. Relatively light aromatic oils in the gas oil range which do not give detrimental gum in gasoline due to the small amounts extracted by the gasoline are not so effective as defoaming agents as are the heavier aromatic oils. Although such light aromatic oils alone are better defoamers than the light paraffinic oils the former have the disadvantage of frequently causing fluorescence.

Paraffinic oils by themselves are ineffective as defoamers and often act as pro-foamers; however, in combination with the surface active salts of the type previously described they have the unexpected property of very greatly improving the defoaming properties of these salts. This property is also true for light aromatic oils but not to such a noticeable extent. However, aromatic oils should not be used if fluorescence in the treated gasoline is undesirable.

Therefore, it is important to obtain an oil which is light enough not to cause undesirable gum content in the gasoline, but yet heavy enough not to be too easily lost in the stripper. Suitable light oils should be free from asphalts, resin, and gum-forming impurities, and must possess boiling ranges between about 400 and about 900° F., preferably between about 500 and about 750° F. Their viscosities may range between about 30 and 200 Saybolt Universal seconds at 100° F., preferred viscosities being between about 40 and 70 seconds at 100° F. Because of general undesirability of fluorescence it is preferred to employ paraffin oils having aniline points above about 122° F., and a specific dispersion below about 150 as determined by a method disclosed in an article by Von Fuchs and Andersen in *Industrial and Engineering Chemistry*, vol. 29, No. 3, March 1937, pp. 319-325.

There are still other properties which these oils must possess: they must be readily dispersible in effective amounts in the aqueous treating or extracting solution, so that the maximum effect may be obtained, and they should be reasonably stable toward the action of small amounts of oxygen in the presence of strong caustic at the elevated temperatures employed in the regeneration step.

Some specific types of oils which may be used and which have the above required properties are: gas oil, light lubricating oil, spray oil, and other extracted oils which have been extracted by such selective solvents as liquid SO₂, nitrobenzene, nitro-toluene, furfural, acetone, aniline, phenol, cresylic acids, dichloroethyl ether, SO₂-benzene mixtures, other selective solvents, or combinations of solvents above, and anti-solvents such as ethane, propane, butane, petroleum ether, etc., as well as some lower boiling extracts.

The amounts of these oils which must be added to reduce the foaming and improve the rate of separation of the treating solution and the hydrocarbon oil vary from about .001% to about 2% by weight, generally about .1%, of the treating solution. Within reasonable limits, the amount of oil necessary is directly proportional to the amount of foaming agents present in the

solution. However, the concentration of this oil in the aqueous alkaline solution must never be so great as to result in a material increase in the gum content of gasoline treated therewith.

Since oils are more easily extracted by the gasolines treated than are the surface active salts, it may be necessary from time to time in a continuous process, i. e. every 10 or 15 cycles of the treating solution, to add small amounts of oil to maintain the concentration in the treating solution within the desired limits to effect efficient defoaming, because small quantities of the oil are lost due to extraction by the gasoline treated. If desired, this addition may be continuous.

As indicated before, the surface active sulfates or sulfonates used in the treatment must be wetted by the aqueous solution, rather than by the hydrocarbons. It has been found that if the agent is first dissolved or dispersed in the gasoline, only a portion will be retained by the aqueous solution upon contact under ordinary extraction conditions, the remainder staying in the gasoline phase. On the other hand, if the agent is first dissolved or thoroughly dispersed in the aqueous solution, it is not usually extracted by the gasolines to any extent under normal extracting conditions.

A preferred method of introducing the surface active agents and mineral oils comprises first producing a slurry in water of the free sulfate or sulfonic acid or of an alkali metal salt thereof. The mineral oil is then added to this slurry, which mixture is then added to the aqueous alkaline extracting solution. The resulting mixture should preferably be heated and thoroughly agitated to insure perfect dispersion or dissolution of the active salt, in order to minimize the danger of transferring a portion thereof to the gasoline phase upon contacting the latter. In a steam regenerative process such as the solutizer process, it is convenient to add the active salt and mineral oil, or preferably its slurry in water, to the spent extracting solution emanating from the extractor. This solution is then heated and thoroughly agitated in the steam stripper in the course of the regeneration step, whereby the desired dispersion or dissolution is achieved.

While in the foregoing the invention has been described as applying particularly to regenerative processes such as the sweetening of sour gasolines by the solutizer process, it is also applicable to the extraction of alkyl phenols, etc., from hydrocarbon oils by processes not calling for regeneration such as those described in U. S. Patents 2,134,390 and 2,213,596. In these processes, alkyl phenols are extracted from distillates containing them with strong caustic soda (25-50% concentration) to result in an extract of high alkyl phenolate content. This extract separates slowly from the distillate, frequently more than a day being required to obtain complete separation. The addition of requisite amounts of a surface active salt of this invention materially reduces the settling time, often causing a complete separation in a few minutes.

In the table below, effects of a number of representative surface active salts and mineral oils covered by this invention are shown. To evaluate their performance samples of a solutizer solution having the following composition

KOH	6 normal
Potassium isobutyrate	1.5 normal
Potassium phenolate	1.0 normal

were subjected to an emulsion and a foaming

test in which they were mixed with a cracked gasoline under conditions similar to those which would be encountered in the solutizer process. The emulsion test was carried out by stirring a 15 ml. sample of solutizer solution with 25 ml. of a cracked gasoline for 5 minutes in a 6" x 1" test tube at a stirrer speed of approximately 2900 R. P. M., and then measuring the time necessary for the solutizer solution to separate from the gasoline. The foaming test was carried out by heating a 20 ml. sample of solutizer solution diluted with 5 ml. of water in a 32 x 600 mm. test tube with two carborundum boiling chips (6 mesh) at such a rate that boiling starts in 3 minutes $\pm$ 5 seconds. The maximum height reached by the solution and foam after boiling starts in the foam rating. The results of these tests were as follows:

Sample No.	Surface active alkali metal salt	Tube foam rating		Stirrer settling time
		Without oil	With oil	
1	None	8.5	7.25	18
2	Alkyl naphthene sulfonate	8.25	6.625	2
3	Long-chain alcohol sulfate	8	6	1
4	Alkyl aryl sulfonate	8.125	3.875	4
5	Sulfonated alkyl hydrocarbon	7.25	5.375	4
6	Petroleum sulfonate	6.625	6.125	3
7	do	6.25	4	3
8	Sodium petroleum sulfonate	5.75	3.75	3

The total amount of additive surface active salt and/or oil for each test was .1 g./100 ml. of solutizer solution. Samples run with both salt and oil additives contained .05 g./100 ml. of each additive. The oil used in the sample was an East Texas gas oil having a boiling range between 491.9 and 710.6° F., an aniline point of 167.9° F., and a specific dispersion of 123. The composition of the oil was 12.3% aromatic carbon (one and two ring), 29.6% naphthene carbon; and 58.1% alkyl carbon.

We claim as our invention:

1. In the process of extracting weak acids normally associated with hydrocarbons from gasolines containing them and being substantially free from acid-sulfuric acid derivatives with an aqueous alkaline solution, the improvement comprising extracting said hydrocarbons with said aqueous solution containing thoroughly dispersed a small amount of a mixture of two agents: (1) a water-soluble surface active alkali metal salt of an acid selected from the group consisting of organic sulfonic acids and sulfate ester acids, which acids are free from carboxyl radicals and (2) a mineral oil having a boiling range between about 400 and about 900° F.

2. In the regenerative process of extracting weak acids normally associated with hydrocarbons from gasolines containing them and being substantially free from acid-sulfuric acid derivatives, with an aqueous alkaline solution to produce a treated hydrocarbon distillate and a spent aqueous solution, wherein said spent solution is regenerated by steam stripping, the improvement comprising extracting said hydrocarbons with said aqueous solution containing dissolved not in excess of about 1% by weight of a water-soluble surface active alkali metal salt of an acid selected from the group consisting of organic sulfonic acids and sulfate ester acids, which acids are free from carboxyl radicals and radicals susceptible to hydrolysis upon steaming in the presence of caustic alkali, having at least 10 carbon atoms and

a molecular weight below about 1000, and said aqueous solution containing dispersed a mineral oil in a concentration not in excess of about 2% by weight thereof, said mineral oil having a boiling range between about 400 and about 900° F.

3. The process of claim 2 wherein said mineral oil is continuously added to said spent solution substantially to maintain said concentration.

4. In the process of sweetening sour gasoline distillates containing mercaptans by extracting them with an aqueous alkaline solution containing a solubility promoter for mercaptans, the improvement comprising treating gasoline with said aqueous solution containing an addition thoroughly dispersed a small amount of a mixture of two agents: (1) a water-soluble surface active alkali metal salt of an acid selected from the group consisting of organic sulfonic acids and sulfate ester acids, which acids are free from carboxyl radicals, and (2) a mineral oil having a boiling range between about 400 and about 900° F.

5. In the process of extracting weak acids normally associated with hydrocarbons from gasolines containing them, and being substantially free from acid-sulfuric acid derivatives, with an aqueous alkaline solution, the improvement comprising extracting said hydrocarbons with said aqueous solution containing thoroughly dispersed a small amount of a mixture of two agents: (1) a water-soluble surface active alkali metal salt of an alkyl naphthene sulfonic acid, and (2) a mineral oil having a specific dispersion of below 150 and a boiling range between about 400 and about 900° F.

6. In the process of extracting weak acids normally associated with hydrocarbons from gasolines containing them and being substantially free from acid-sulfuric acid derivatives, with an aqueous alkaline solution, the improvement comprising extracting said hydrocarbons with said aqueous solution containing thoroughly dispersed a small amount of a mixture of two agents: (1) a water-soluble surface active alkali metal salt of an alkylated hydrocarbon sulfonic acid, and (2) a mineral oil having a boiling range between about 400 and about 900° F.

7. In the process of extracting weak acids normally associated with hydrocarbons from gasolines containing them and being substantially free from acid-sulfuric acid derivatives, with an aqueous alkaline solution, the improvement comprising extracting said hydrocarbons with said aqueous solution containing thoroughly dispersed a small amount of a mixture of two agents: (1) a water-soluble surface active alkali metal salt of an alkylated aromatic sulfonic acid and (2) a mineral oil having a boiling range between about 400 and about 900° F.

8. In the process of extracting weak acids normally associated with hydrocarbons from gasolines containing them and being substantially free from acid-sulfuric acid derivatives, with an aqueous alkaline solution, the improvement comprising extracting said hydrocarbons with said aqueous solution containing thoroughly dispersed a small amount of a mixture of two agents: (1) a water-soluble surface active alkali metal salt of a petroleum sulfonic acid, and (2) a mineral oil having a boiling range between about 400 and about 900° F.

9. In the process of extracting weak acids normally associated with hydrocarbons from gasolines containing them and being substantially free

from acid-sulfuric acid derivatives, with an aqueous alkaline solution, the improvement comprising extracting said hydrocarbons with said aqueous solution containing dissolved from .001% to 1% by weight of a water-soluble surface active alkali metal salt of an acid selected from the group consisting of organic sulfonic acids and sulfate ester acids, which acids are free from carboxyl radicals and radicals susceptible to hydrolysis upon steaming in the presence of caustic alkali having at least 10 carbon atoms and a molecular weight below about 1000, and said aqueous solution containing dispersed from .001% to 2% by weight of a mineral oil having a specific dispersion of below 150, a boiling range between about 400 and about 900° F., and an aniline point above about 122° F.

10. In the regenerative process of sweetening a sour gasoline distillate containing mercaptans by extracting it with an aqueous alkaline solution containing a solubility promoter for mercaptans to produce a treated hydrocarbon distillate and a spent aqueous solution containing absorbed mercaptans wherein said spent solution is regenerated by steam stripping, the improvement comprising dissolving in said aqueous solution a small amount of a water-soluble surface active alkali metal salt of an acid selected from the group consisting of organic sulfonic acids and sulfate ester acids, which acids are free from carboxyl radicals and radicals susceptible to hydrolysis upon steaming in the presence of caustic alkali having at least 10 carbon atoms and a molecular weight below about 1,000, and dispersing in said aqueous solution a small amount of a paraffinic mineral oil having a boiling range between about 500 and about 750° F. and not more than 20% aromatic carbon.

11. A treating solution consisting of an aqueous solution of an alkali metal hydroxide having a normality of at least 2 and containing dissolved a substantial amount of solubility promoter for mercaptans, a small amount not in excess of about 1% by weight of a water-soluble surface active alkali metal salt of an acid selected from the group consisting of organic sulfonic acids and sulfate ester acids, which acids are free from carboxyl radicals, and said solution also containing thoroughly dispersed therein not in excess of about 2% by weight of a mineral oil having a boiling range between about 400 and about 900° F.

12. A treating solution consisting essentially of an aqueous solution of an alkali metal hydroxide having a normality of at least 2 and containing dissolved a solubility promoter for mercaptans, a small amount not in excess of about 1% by weight of a water-soluble surface active alkali metal salt of an acid selected from the group consisting of organic sulfonic acids and sulfate ester acids, which acids are free from carboxyl radicals

and radicals susceptible to hydrolysis upon steaming in the presence of caustic alkali having at least 10 carbon atoms and a molecular weight below about 1000, and said solution also containing thoroughly dispersed therein from .001% to 2% by weight of a mineral oil having a boiling range between about 400 and about 900° F. and an aniline point above about 122° F.

13. A treating solution consisting essentially of an aqueous solution of an alkali metal hydroxide having a normality of at least 2 and containing dissolved a substantial amount of a solubility promoter for mercaptans, and a small amount not in excess of about 1% by weight of a water-soluble surface active alkali metal salt of an alkyl naphthene sulfonic acid and said solution also containing thoroughly dispersed therein from .001% to 2% by weight of a paraffinic mineral oil having a boiling range between about 500 and about 750° F., an aniline point above about 122° F., and not more than 20% aromatic carbon.

14. A treating solution consisting essentially of an aqueous solution of an alkali metal hydroxide having a normality of at least 2 and containing dissolved a substantial amount of a solubility promoter for mercaptans, and a small amount not in excess of about 1% by weight of a water-soluble surface active alkali metal salt of an alkylated hydrocarbon sulfonic acid, and said solution also containing thoroughly dispersed therein not in excess of about 2% by weight of a mineral oil having a boiling range between about 400 and about 900° F.

15. A treating solution consisting essentially of an aqueous solution of an alkali metal hydroxide having a normality of at least 2 and containing dissolved a substantial amount of a solubility promoter for mercaptans, and a small amount not in excess of about 1% by weight of a water-soluble surface active alkali metal salt of an alkylated aromatic sulfonic acid, and said solution also containing thoroughly dispersed therein not in excess of about 2% by weight of a mineral oil having a boiling range between about 400 and about 900° F.

16. A treating solution consisting essentially of an aqueous solution of an alkali metal hydroxide having a normality of at least 2 and containing dissolved a substantial amount of a solubility promoter for mercaptans, and a small amount not in excess of about 1% by weight of a water-soluble surface active alkali metal salt of a petroleum sulfonic acid, and said solution also containing thoroughly dispersed therein not in excess of about 2% by weight of a mineral oil having a boiling range between about 400 and about 900° F.

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