

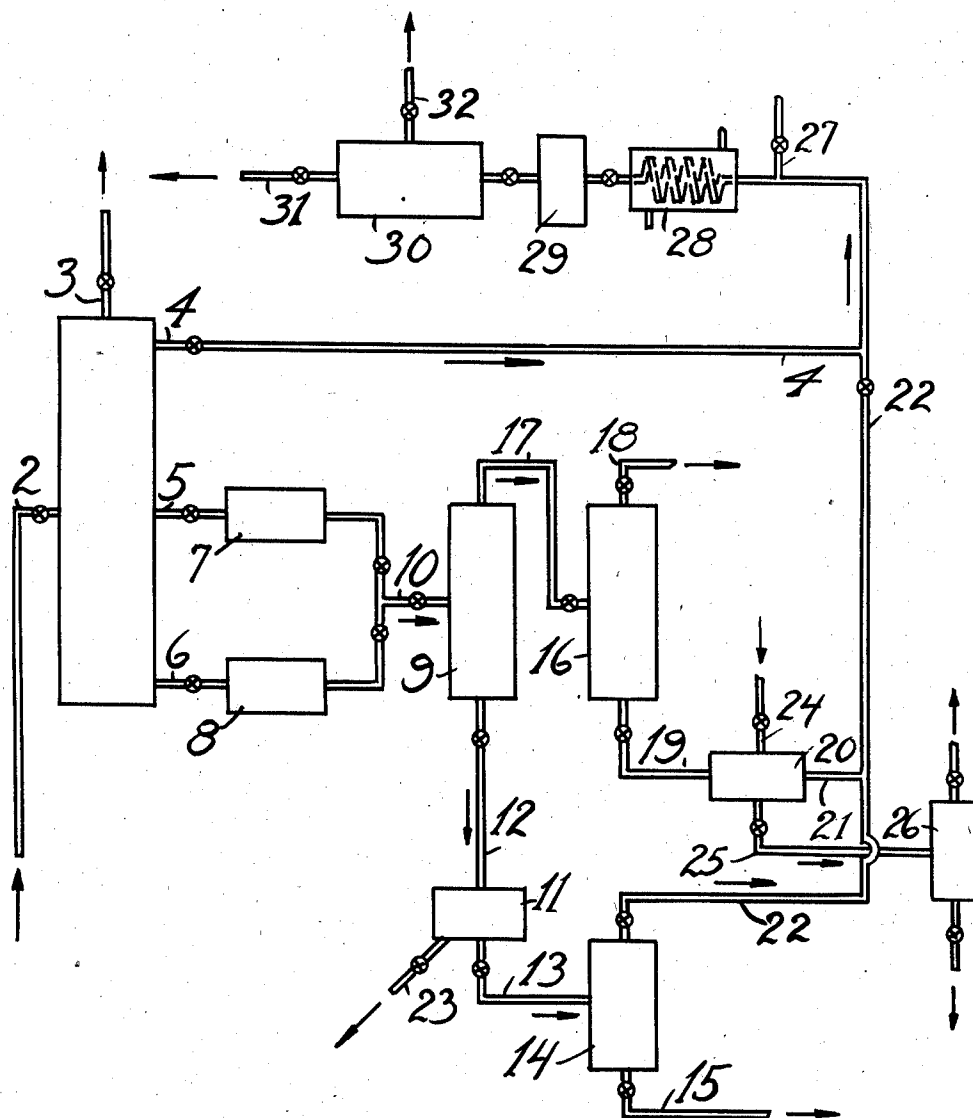
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PROCESS FOR THE PRODUCTION OF MOTOR FUEL

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PROCESS FOR THE PRODUCTION OF
MOTOR FUEL

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1 Claim. (Cl. 196—28)

The present invention relates to improved high quality motor fuels. The invention more particularly relates to the treatment of mineral oils boiling in the motor fuel boiling range with catalyst of the character having the ability to desulfurize the same and is particularly concerned with a novel method of producing motor fuels of high octane numbers and of high susceptibilities for knock improving agents by the use of bauxite.

In accordance with the present process sulfur or suitable organic sulfur compounds are added to petroleum oils boiling in the motor fuel range and the resulting mixture treated with bauxite or an equivalent desulfurizing catalyst under substantially non-cracking conditions. A particularly preferred modification of the present invention is to add sulfur or a suitable organic sulfur compound to petroleum feed oils having a relatively low sulfur content which feed oils would not normally be desulfurized and to pass the resulting mixture over bauxite or an equivalent catalyst under substantially non-cracking conditions.

It is known in the art to treat petroleum oils having an undesirable naturally occurring high sulfur concentration with various desulfurizing catalysts particularly with bauxite in order to reduce the sulfur concentrated to the desired degree. However, heretofore it was assumed that no possible benefit could result by adding additional sulfur or sulfur compounds to the petroleum oils prior to treating the same with bauxite or an equivalent desulfurizing catalyst. I have now discovered a process by which it is possible to produce motor fuels having unexpectedly high octane numbers and having high susceptibilities for knock-suppressing agents, as for example, tetraethyl lead and the like. In accordance with my process, a petroleum oil boiling in the motor fuel boiling range is mixed with a relatively small quantity of free sulfur or a suitable organic sulfur compound and the mixture passed over bauxite or an equivalent desulfurizing catalyst under non-cracking conditions.

My invention may be readily understood by reference to the attached drawing illustrating one modification of same.

For purposes of description the crude oil is taken to be a relatively low sulfur crude, as for example, an East Texas crude. The crude oil is introduced into distilling unit 1 by means of oil feed line 2. Temperature and pressure conditions are maintained to remove overhead fixed

gases by means of line 3 and to segregate a prime cut fraction by means of line 4, a gas oil cut by means of line 5 and a reduced crude cut by means of line 6. It is to be understood that distilling unit 1 may comprise any suitable equipment for segregating these fractions or equivalent fractions, as for example, a series of crude stills, equivalent distillation towers or pipe stills. The gas oil and reduced crude are subjected to temperature and pressure conditions in cracking units 7 and 8 adapted to secure the formation of fractions boiling in the gasoline boiling range. These cracking units likewise may comprise any desirable modification. The cracked distillate which boils in the gasoline boiling range is introduced into debutanizer 9 by means of line 10. Temperature and pressure conditions are maintained on debutanizer 9 in order to remove as bottoms a petroleum fraction boiling in the range from about 200° to 420° F. The debutanizer bottoms are introduced into acid treating unit 11 by means of line 12 and then introduced into rerun still 14 by means of line 13. Temperature and pressure conditions are maintained in rerun still 14 so as to remove overhead a petroleum distillate of the desired end point and to remove as a bottoms by means of line 15 the high boiling polymer fraction. The overhead from debutanizer 9 is introduced into stabilizing unit 16 by means of line 17 and the fixed gases removed overhead from said stabilizing unit by means of line 18. The stabilizer bottoms are removed by means of line 19, caustic treated in treating unit 20, removed by means of line 21 and combined with the overhead removed from unit 14 by means of line 22. The acid sludge from unit 11 is removed by means of line 23 and treated in a manner to regenerate the acid. The caustic solution is introduced into treating unit 20 by means of line 24, withdrawn by means of line 25 and treated in unit 25 in a manner to regenerate the caustic. The petroleum fractions boiling in the gasoline boiling range, which are segregated as stabilizer bottoms and overhead from the rerunning unit, are combined with the prime cut naphtha, removed by means of line 4 and mixed with free sulfur which is introduced by means of line 27. The mixture passes through mixer 28 and heater 29 and is introduced into bauxite treating unit 30. The bauxite treated oil is removed from bauxite unit 30 by means of line 31 while other products are removed by means of line 32.

The process for the present invention may be widely varied, although it may be applied in the

treatment of any petroleum oil boiling in the motor fuel boiling range. It is particularly applicable in the treatment of motor fuels which, due to their relatively low sulfur content, would normally not be bauxite treated. Oils of this character have sulfur contents in the range below about 0.05% sulfur.

Although any organic sulfur compound may be utilized as an addition agent, the preferred method is to employ free sulfur. The amount of sulfur added will depend upon the particular mineral oil being treated, the sulfur content of the oil, as well as upon the particular conditions employed in the bauxite treating unit. In general, when the low sulfur oils contain from .01 to .1% of sulfur, it is preferred to add from .05 to .5% of free sulfur. If organic sulfur compounds be employed, the preferred materials are alkyl mercaptans, particularly those alkyl mercaptans boiling in the range below the boiling range of butyl mercaptans. Under certain conditions it is very desirable to segregate mercaptans from one stage in the refining of the petroleum oil, as for example, in the soda regeneration step, and to utilize these segregated mercaptans as addition agents for the petroleum oil being fed to the bauxite treating unit.

The conditions employed in the bauxite treating unit are non-cracking conditions and may vary widely. In general, it is preferred to desulfurize at a temperature in the range from about 400° F. to 850° F., preferably in the range above 800° F. Although atmospheric pressure may be employed, especially desirable results are secured when using pressures in the range above 100 lbs.

per square inch, particularly in the range of about 350 to 450 lbs. per square inch. Although any catalyst having the ability to desulfurize the naphtha may be used preferred results are obtained when utilizing bauxite, particularly when using bauxite in conjunction with low sulfur cracked naphtha. Although the process of the present invention will increase the susceptibility of the treated motor fuel with respect to any knock suppressing agent, it is particularly effective in increasing the susceptibility of the motor fuel with respect to tetraethyl lead.

The process of the present invention is not to be limited by any theory or mode of operation but only by the following claim in which it is desired to claim all novelty insofar as the prior art permits.

I claim:

Process for the production of a motor fuel from a petroleum oil boiling in the range below about 420° F., having a high octane number and a high susceptibility for knock suppressing agents, said petroleum oil having a sulfur content of less than 0.1% and being of a character that it would not normally be desulfurized by bauxite treatment, comprising adding to said petroleum oil from about 0.1% to 0.5% of free sulfur, passing the oil over a catalyst comprising bauxite at a temperature in the range from about 400° F. to 850° F. and at a pressure in the range from about 100 to 450 pounds per square inch, controlling the temperature and pressure within said ranges in a manner that substantially no cracking of the oil occurs.

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