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COKING HYDROCARBON OILS

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This invention relates to improvements in the coking of heavy oils, such as crudes, topped crudes, flux oils, other residual oils and the like, and the invention relates more particularly to improvements in the coking of such oil stocks containing foreign solids such as salt.

One of the general methods employed in the handling of crude petroleum involves separation from the crude stock by distillation of a maximum proportion of vaporizable oil components, these oil components being collected as distillate fractions and the distillation being continued until the residue is reduced to coke. The distillation may be carried out in a single still or in successive stages in two or more stills. This general method is of special application in the handling of crude stocks or residual stocks the handling of which usually involves difficulties due to corrosion, because of the character or quantity of sulphur compounds in the stock, for example.

As usually practiced, the coking operation involved in this general method is somewhat critical in two respects, regulation to avoid subjecting the apparatus used to excessive stresses, the stresses being severe at best, and regulation to produce a commercially valuable coke product. When crude stocks containing foreign solids are subjected to such coking operations, the coking operation becomes even more critical, making regulation of the operation unusually difficult and, from the practical standpoint, frequently impossible. As noted above, this invention relates particularly to improvements in the coking of heavy oil stocks containing such foreign solids.

I have discovered that the presence in the stock charge subjected to such coking operations of pitch constituents such as those produced as an incident to the relatively severe cracking involved in the manufacture, by cracking, of gasoline renders the coking operation less critical, assists in the production of a commercially more valuable coke product and facilitates cleaning of the apparatus in which the coking operation is carried out when the primary stock to be reduced to coke contains foreign solids. I do not, at present, have any entirely satisfactory explanation of the action of these pitch constituents in the coking operation, but I have proved the result in commercial operations.

According to this invention, a stock containing pitch constituents produced by severe cracking is supplied to the coking operation together with the primary stock, containing foreign solids, to be reduced to coke. The pitch constituents I have found to be useful in carrying out the invention are those formed during cracking operations in which the stock undergoing cracking is subjected to a temperature upwards of about 800° F. The tars produced in pressure still operations for the production of gasoline from heavier oils such as gas oil are, apparently, of special value in carrying out the invention. Such tars may be used as they are discharged from the pressure still, or the residue remaining after evaporation of oil components from the tar as discharged from the pressure still may be used, in carrying out the invention. Tars produced in other severe cracking operations are also useful in carrying out the invention. For example, tars containing pitch constituents produced in vapor phase cracking operations in which the stock undergoing cracking is subjected to a temperature upwards of 950–1100° F. are also useful in carrying out the invention. The exact proportion of such pitch constituents supplied to the coking operation is not critical. The use of more concentrated tars, such as pressure still tar residues from which oil components have been evaporated, makes possible the introduction of an increased proportion of such pitch constituents with less dilution of the primary stock to be reduced to coke.

The following example will further illustrate the invention: In reducing a topped West Texas crude petroleum to coke in conventional externally fired shell coke stills, a pressure still tar as discharged from pressure stills in which a Mid-Continent gas oil is cracked for the production of gasoline under 125 pounds per square inch pressure taking off 45% as pressure distillate is mixed with the topped crude supplied to the coke stills in proportions of 25% pressure still tar and 75% topped crude petroleum.

The proportion just mentioned has been found to give good results in the specific case just mentioned. It will be understood that this proportion may vary widely depending both upon the character of the primary stock to be reduced to coke and the character, particularly the concentration, of the stock containing the pitch constituents produced by severe cracking.

The advantages of the invention are quickly apparent in the operation of conventional externally fired shell coke stills. For example, comparing two operations the same except in that the diluent stock containing pitch constituents produced by severe cracking is included in one case and not in the other, the still bottom usually becomes "hot" in the latter case at a much earlier point in the operation than in the former case, premature "hot" bottoms being frequent if not

usual in the latter case in the coking of stocks containing foreign solids. The invention is also useful in connection with other types of coking operations, in which stocks containing foreign solids are reduced to coke, such as those in which the stock is reduced to coke in a coking receptacle internally heated by the direct introduction of hot gases or vapors or a hot gas or vapor mixture.

The invention is of special value in the handling of crude stocks such as those which are at present being produced in the West Texas, the Pampa and the Amarillo fields.

I claim:

1. The method of producing petroleum coke which comprises forming a mixture of residual tar formed by the cracking distillation of petroleum oil and residuum formed by the simple distillation of crude petroleum oil, and maintaining said mixture of said tar and said residuum at coking temperature until it is substantially reduced to coke.

2. The method of producing petroleum coke which comprises heating to coking temperature a mixture of residual tar formed by a cracking distillation of petroleum oil and residuum formed by the simple distillation of crude petroleum oil, and maintaining said mixture of said tar and said residuum at such temperature until it is substantially reduced to coke.

3. The method of producing petroleum coke from residual tar formed by a cracking distillation of hydrocarbon oil and residuum formed by the simple distillation of crude mineral oil which comprises heating a mixture of said residual tar and said residuum to coking temperature, withdrawing vaporized products from said mixture and maintaining the unvaporized portion of said mixture, at coking temperature until it is reduced to coke.

4. The method of producing petroleum coke which comprises heating to a coking temperature a mixture consisting substantially entirely of residual tar formed by a cracking distillation of petroleum oil, and residuum formed by the simple distillation of crude petroleum oil, and maintaining said mixture at coking temperature until it is substantially reduced to coke.

5. The method of producing petroleum coke which comprises forming a mixture of residual tar derived from the cracking of petroleum oil and residuum formed by the simple distillation of crude petroleum, and maintaining said mixture at coking temperature until it is substantially reduced to coke.

6. In coking operations in which petroleum stocks which have not been subjected to severe cracking treatment but which contain foreign solids are reduced by distillation to substantially dry coke, the improvement which comprises supplying another stock containing pitch constituents produced by severe cracking to the coking operation together with the petroleum stock containing foreign solids to be reduced to coke, and reducing the mixture to a substantially dry coke-like residue by distilling vaporizable oil components therefrom.

7. In coking operations in which petroleum stocks which have not been subjected to severe cracking treatment but which contain foreign solids are reduced by distillation to substantially dry coke, the improvement which comprises supplying a pressure still tar to the coking operation together with the petroleum stock containing foreign solids to be reduced to coke, and reducing the mixture to a substantially dry coke-like residue by distilling vaporizable oil components therefrom.

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