

## The Study of the Influence of Load's Chemical Composition in the Coking Process on the Efficiency and the Quality of Coke

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Keywords: Cooking, Oil Residue, Dispersant, Aggregation Stability

### Abstract:

This research was achieved in order to allow the study of the chemical composition impact of the coking process load on the efficacy and the quality of coke. For this reason, the coking of the following loads was realized: Atmospheric residue (RAT), vacuum Residue (RSV) and catalytic Residue of cracking (RCC). (The residues are obtained from an Algerian crude oil). As the oil residues are rich for their strongly polar composition, such as the asphaltene resins, and complex structures units (SCU), which has a role in the development of coke, and as the dispersion of these latter progresses the quality of coke, a study on the stability of aggregation was carried out by the accumulation of one stabilizer (oil Extract) in the coking process load. The Compounding (Extracted from /RCC oil) has been derived to the best efficiency of coke. The study consists of the influence., this is characterized by the analyses Infra-red (IR) and x-ray diffraction (XRD).

### Introduction:

The coking of the oil residues consists of the decomposition of this latter by the delayed coking process, or by fluidized bed coking.

The units of coking are generally biased by heavy residues, such as: vacuum residue, catalytic residue of cracking, residue of viscoreduction and asphalt or extracted from lubricating oils. Coking develops these oil residues, it produces:

**Gas:** they consist of a fuel gases used as fuel in the unit of coking, or sent after washing towards fuel gases of the refinery.

**Naphthas:** light naphtha, after a hydro-processing is sent to the pool gasoline, heavy naphtha constitutes a catalytic load of reforming.

**Distillates:** the light distillate, after a hydro-processing is sent to the pool gas oil of the refinery, and heavy distillate is used like charges with FCC, in mixture with the products of distillation.

**Coke:** several types of coke can be produced: Coke sponges (Sponge coke), needle coke (Needle coke), Coke with balls (Shot coke) and combustible Coke.

The use of coke is directed according to the quality of this latter. The four aspects which affect the quality and the price of coke are:

Sulphur content, content of metals, hardness and the physical structure.

The coke of best quality is used for the manufacture of the anodes, the production out of aluminum or of the electrodes for the production out of steel, is the needle coke, which must be calcinated before its use.

The parameters influencing the quality and the efficiency of coke are: the nature of the load and operating conditions of the coking process.

The main objective of this research consists of the realization of a coking (thermal decomposition) of the oil residues for:

- To produce a coke of a precise quality.
- To optimize the load which gives the best efficiency, by coking of various compounding (oil Extract /Residue)?
- Valorization of its residues by recovery of a distillate and gasoline of characteristics defines.

### Conclusion:

We have been realized a coking process of following compounding: (Oil RAT/Extract), (oil RSV/Extract) and (oil RCC/Extract).

The initial objective points out the use of a dispersant (Extracted from oil) at in order to direct the deposit of the aggregates formed from the asphaltenes and complex Structures units (SCU) characterized by the stability of aggregation, which is the objective end-up by a coke of a crystalline structure.

The study of the various loads of coking is to be added to the following mass efficiency: More than 36% from 100% RCC, between 25% and 26% starting from the following loads:

95% RCC + 5% Extract of oil, 90% RCC + 10% extract of oil, 50% RCC + 50% RSV and 40% RCC + 40% RSV + 20% Extract of oil.

The coke efficiency depends on the content of the load of heavy aromatic compounds, such as SARA analysis of the oil residues which has been demonstrated.

The best efficiency of gasoline that can be recovered is 20, 69%, it was obtained starting from the distillate of the coking process of the load (40% BRA+ 60% oil Extracts). The CPG of the gasoline revealed a content olefin higher than 9%, and more than 30% of aromatics. The x-rays diffraction showed an amorphous structure, however, with a beginning of their crystalline structures arrangement. The DRX of the coke obtained from (95% RCC + 5% Extract of oil), proves the presence of peaks corresponding to components of crystalline structures, 1, 81921 [A°].