Use Of Edible Oils For Ultra- Fine Coal Recovery Using Oil Agglomeration Technique

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Abstract: Coal fines (CF) of -75 µm (200 mesh) were agglomerated using vegetable oils (sesame oil and castor oil) with varying dosages from 5-10-20. Other parameters under this study were % ash rejection (AR) and % yield. For 6% and 9% oil dosage the yield was found to be 84.93% using castor oil while for sesame oil it was merely 74.22%. Ash % ranges from 21-24% in both the oils.

Keywords: oil agglomeration; coal beneficiation, coal fines; coal cleaning, vegetable oils

1. Introduction:

A huge amount of fines are generated annually because of the use of modern mining methods. Suspended fine particulate solids are also generated during coal washing that are detrimental to environment, eventually disrupting the ecological balance of the water bodies and the surrounding landmass. Therefore, there is an urgent need to utilize these fines and tackle environmental hazards through appropriate beneficiation processes and simultaneously recover the coal fines [1-6].

Though there are many methods of coal beneficiation used like froth flotation, Water-Only cyclones, flocculation, etc but techniques for treating ultrafines (<75 µm), have not been found so effective. Hence, of all these processes, oil-agglomeration with simultaneous beneficiation and recovery capability will be vital due to its ability to process low rank / oxidized coals as well as finer size coal fractions. Its simplicity from the operational point and effectiveness to beneficiate high ash coals with appreciable combustibles recovery, make oil agglomeration to be better alternative technique for the future than other methods. [7-18].

2. Experimental

The coal was collected from the Jamadobawashery for the experiment. Coal was then properly mixed using the sampling procedure. Riffling, Coning and quartering were the main steps in the process. This was done to attain further uniformity in the obtained coal sample. After coining and quartering was done to reduce the total amount of the sample which was pulverized to -75µm (-212micron) for feed ash and other analysis.

The semi coking coal was used for all the experiments of oil agglomeration which was obtainedafter sample preparation. In sample preparation, coning and quartering was done.We procured raw coal in the form of lumps which was ground and then sieved to getsize fraction i.e., (-75 µm). The ideainselecting such fine range of coal particle size fractions was to study the effect of the actual coal water slurries which contain ultra-fine sizes of coal particles. We used air-tight plastic containers to preserve the sieved samples. This also ensured inert atmosphere of the coal [19].

Oil agglomeration experiments were performed in the commercial bladed vertical impeller equipped in anagglomerating vessel. Aqueous slurries of coal fines of different particle sizes (-75 µm) each having a pulp density of 6% and 9% (w/v) were prepared in the laboratory. The agglomerated time was fixed at 15 min for both the oils i.e castor and sesame oil.

3. Conclusion:

As shown in the Figure 1 and Figure 2, oil agglomeration tests were done for the coal fines of -75 µm (200 mesh) were agglomerated using oils (sesame oil and castor oil) with varying Oil dosages from 5-10-20. Other parameters under this study were % ash rejection (AR) and % yield.

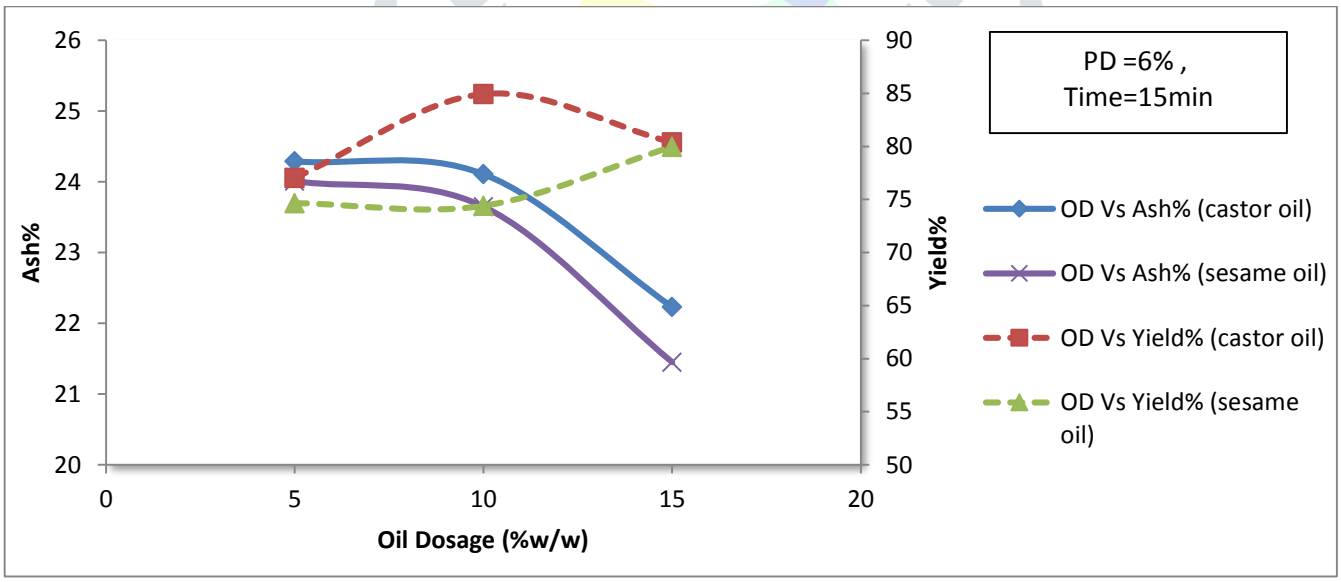

Figure 1. Effect of Oil dosage (OD)and Ash%; OD and Yield for Castor and Sesame oil at 6% PD and time 15 min

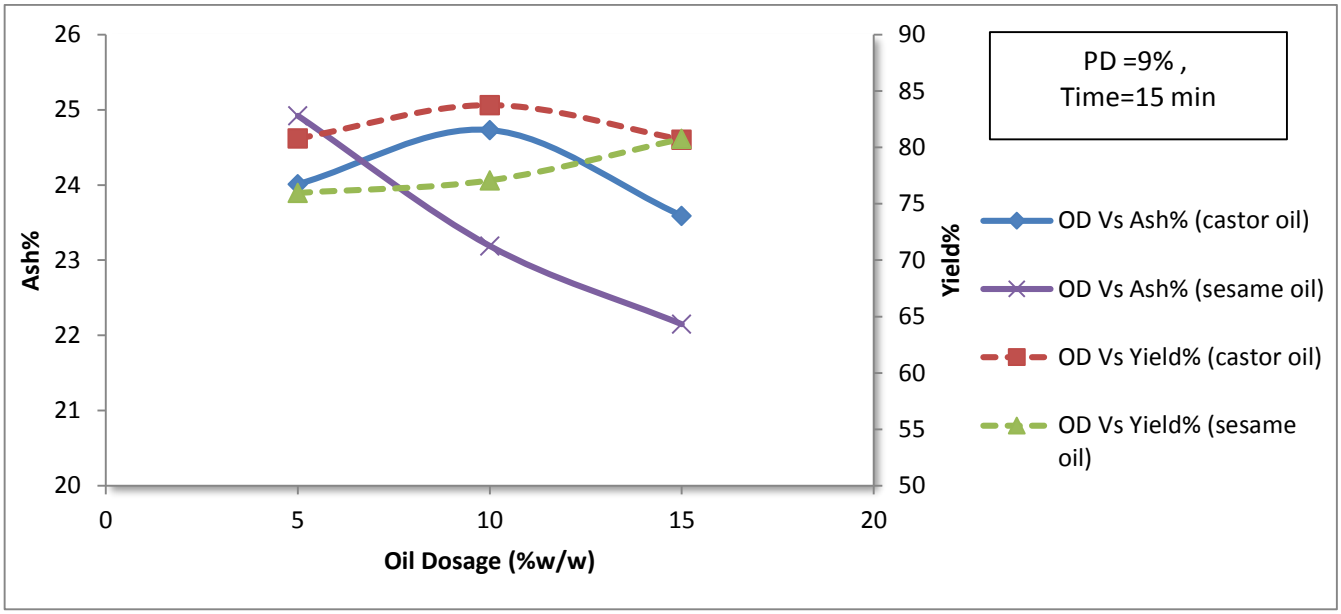

Figure2. Effect of Oil dosage (OD)and Ash%; OD and Yield for Castor and Sesame oil at 9% PD and time 15 min

For 6% and 9% oil dosage the yield was found to be 84.93% using castor oil while for sesame oil it was merely 74.22%. Ash % ranges from 21-24% in both the oils.

As oil agglomeration is an easy process to recover coal of ultra-fine range of coal wastes and coal slurries. Effort are needed to find suitable low cost oil so that the process becomes more economical.

4. References

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