UDC 628.38: 662.76

GETTING BOILER FUELS FROM LIGNITE BY PYROLYSIS

Y. Kozhevnikov, A. Chizhikov, V. Chirkov,Y. Schekochikhin, O. Aladinskaya, A. Abramov

Brown coal - fossil fuel plant of low degree of coalification, a transitional form from peat to coal. In Russia, the brown coals are coals with higher calorific value wet ash-free mass of less than 24 MJ / kg. A similar calorific value to separate the lignite and coal provided the international classification. Brown coal in the piece and have a powder color from light yellow to black; bulk density of 1.2-1.5 tons / m3 and bulk - 0,700,97 t / m3. There are soft, earthy, matte, lignite and dense (brilliant) varieties. On air lignite quickly loses moisture, cracks and crumbles.

The vast majority of brown coal for the material composition are humites. Brown coals are characterized by very high humidity (60%) with large variations in ash content (by 7-10% to 38-40% for a working fuel). Consequently, the calorific value ranges and brown coal - from 6.5 to 18.5 MJ / kg. Near Moscow brown coal in operation have humidity to 35, Kansk-Achinsk basin and Bashkiria to 45 to 60%. Even higher moisture has peat (80% in the reservoir and to 45% after natural drying during production).

With increasing degree of metamorphism in the brown coal increases the carbon content, the specific heat of combustion, reduces the oxygen content. Brown coals have a higher content of phenolic, carboxyl and hydroxyl groups, the presence of free humic acid content which decreases with increasing degree of metamorphism from 64 to 2-3% and the resin 25 to 5%. Some soft brown coal deposits provide a high yield of benzene.

Total world resources of brown coal are estimated (to a depth of 600 m) in 4.9 trillion. m. World reserves of brown coal in the amount counted 1.3 trillion. tons, of which measured (in the Russian Federation in categories A + B + C1) 0.3 trillion. m.

The most promising method of processing of brown coal in the boiler fuel is

pyrolysis. Pyrolysis occurs conversion of organic compounds belonging to the brown coal, resulting in degradation at high temperatures. Generally, the term is used in a narrower sense, and define it as a high-temperature process of deep thermal converting raw coal, comprising the degradation of the molecules of the starting materials, their isomerization, and other changes.

The purpose of research - to provide boiler fuel from brown coal by pyrolysis.

Materials and methods of research. The target product is a brown coal pyrolysis gas rich in unsaturated hydrocarbons, ethylene, propylene, butadiene. It is known that on the basis of these hydrocarbon polymers are prepared for the production of plastics, synthetic fibers, rubbers and other important products. The pyrolysis of coal are also available liquid hydrocarbon products heavier than diesel fuel, but lighter fuel oil. The liquid hydrocarbon fraction of pyrolysis brown coal burns well without forming soot.

Considered raw materials provide the highest yield of the desired products with minimal coking. The industry received widespread installation of tube-type pyrolysis. In our studies, we used pyrolysis plant for the production of the Pilot Plant "Alexander" and the Laboratory of biofuels FGBNU VIESH.

Operating temperature setting range - up to 750 ° C. Continuous supply of a small amount of raw material with a moisture content of 40% W = allows short residence time of the primary products of the thermal degradation of organic material in the zone in a high temperature zone of the reactor, which provides output to capacitor advantageously macromolecular compounds which form a significant amount of liquid hydrocarbon phase. Gumming in this case does not occur. The hydrocarbon liquid passes fridge and condenses in the drive.

The results of research. The liquid hydrocarbon phase is well mixed with the diesel fuel does not separate after a prolonged storage for more than 90 days, good support combustion without forming soot, and has no strong smells. Sulfur-containing hydrocarbons has been detected. The solid phase contains metal sulfides.

Conclusions

It is found that the brown coal pyrolysis produces 35-40 % of the liquid hydrocarbon phase in performance close to the diesel fraction, which can be used as an additive to diesel fuel varietal, either in its original form as a boiler fuel.