RESEARCH OF SECONDARY BIOMATERIALS AS POTENTIAL ENERGY SOURCE FOR MINING LABOUR

Svitlana Lysytska[1], Volodymyr Gerasimenko[2], Vasyl Kravets[2] and Tatiana Kholodenko[3]

[1]*National Technical University "Dnipro Polytechnic", Dnipro, Ukraine*
[2]*Ukrainian State University of Chemical Technology, Dnipro, Ukraine*
[3]*State Enterprise "Research and Production Association "Pavlograd Chemical plant", Dnipro, Ukraine*
lsvet050549@gmail.com

The increase of ecology-economical indexes of mining industry processes is related largely to the improvement of existing and creation of new methods of conduct of explosive works. It is known that the labour intensiveness of explosion preparation during realization of openwork is 30–40% from the general mining process, with the use of underground method the specific gravity of drilling-blasting works increases to 50–70%. Therefore a relevant task is the choice of the explosive materials providing on the one hand efficiency of technology, and with another – its ecological safety. Exploding composition represent the systems including explosive and unexplosive components chemically untied among themselves. Among them in mining operations the dynamites, ammoniates, oxyliquites, dynamons, igdanites and etc. are most often used. The various carboniferous materials having high absorbing ability (wood or cork powder, peat, moss, some synthetic materials) belong to the unexplosive substances performing function of solid carriers-adsorbents. Taking into account that in composition oxyliquites it is possible to change both an explosive component (to use liquid oxygen, mixture of oxygen with ozone, beryllium or other) and unexplosive, it does not limit the selection of source of raw materials. In addition, carbon-containing secondary plant materials are characterized by rather high heat combustion (for a sunflower husk – 15,5-17 MJ/kg of thermal energy).

In this regard an objective of this research is the analysis of different types of the biomaterials representing carboniferous adsorbents and a potential energy resource on their basis and also justification of a possibility of use of such substances in exploding composition.

Researches of separate parameters of different types of wastes of vegetable cultures (sunflower husk, buckwheat and rice husk) were conducted by their rough-down, namely drying on air to an air-dry state – capillary moisture 12%, then they were mechanically crushed on the special centered impact mill with a step disk rotor designed by employees of Ukrainian State University of Chemical Technology. The design of this type of mill makes it possible to regulate the granulometric composition, the physical and mechanical properties of the finished product and the degree of its drying (moisture) by increasing the temperature in the grinding zone. The productivity of the mill used for fibrous materials is 200 kg/h. In according to data of chemical analysis, the general maintenance of an organic part in vegetable samples was presented by a carbon (more than 50%), hydrogen (to 6.0%), nitrogen (to 1%), sulphur (to 0.05%) and low ash-content (2-4%). A small amount of sulfur compounds will lead to less toxic products of the explosion. It should be noted that the power capacity of the studied biomaterials is concentrated mainly in a lignin-carbohydrate complex. By means of the scanning microscope the microstructure prevailing (72%) fractions with sizes of particles <100 μm was studied. It was established that the received particles are characterized by acicular shape and spherical shape, there are not undesirable processes of decrystallizing (amorphisations) of supramolecular structure of cellulose in them, and it creates availability to aeration and favorable conditions to reaction behavior of oxidation. To the important technical parameters of the biomaterials prepared by the offered method it is necessary to take porosity and developed specific surface (to 150 m^2/g).

Thus, the crushed biomaterials received on the basis of industrial wastes (sunflower husk, buckwheat husk) can serve as a valuable resource of explosive mixes and solve thereby technical, an environmental problems of utilization of secondary raw materials.

Key words: Exploding Composition, Secondary Biomaterials in a Mining Production, Energy Resources, Porosity and Adsorption Power