SAFAA HASSAN AYOUB
Polotsk State University
SIARHEI YAKUBOUSKI
Polotsk State University
YULIYA BULAUKA
Polotsk State University

THE METHOD OF DISPOSAL OF CELLULOSE AND LIGNIN-CONTAINING WASTES OF THE LEBANESE REPUBLIC BY OBTAINING OIL ABSORBERS

In the Lebanese Republic, the issue of the rational utilization of large-tonnage cellulose and lignin-containing wastes of woodworking and agriculture remains unsolved, and their storage in dumps is seriously harmful to the environment as a result of leaching of extractive substances, anaerobic decomposition and possible spontaneous combustion. At the same time, the modernization of oil terminals, oil pipelines and the upcoming development of offshore oil and gas deposits in the Lebanese Republic require studies to reduce the environmental burden while eliminating and localizing the possible ingress of oil and its components into ecosystems. From 5 to 10 million tons of oil products enter the environment annually into the environment (which makes up 5-7% of all extracted and processed raw materials). On average, during a single accident of an oil pipeline, 2 ... 2.5 tons of oil is emitted, rendering it unusable over 1 km2 of land. One ton of oil pollutes 12 km^2 of the water surface. The water content of petroleum products above 0.1 mg / l gives the fish meat an unavoidable aftertaste and a specific smell of oil. Petroleum products in the soil irreversibly inhibit the development of plants at a concentration of more than 2 g per 1 kg of soil (this is the threshold of phytotoxicity) [1].

The development of the technology for producing low-cost oil sorbents for the collection of spills of oil and oil products based on natural cellulose or lignin-containing waste with high sorption characteristics and having an organic base was the goal of this study.

Over ten samples of cellulose- and lignin-containing waste from woodworking and agriculture were selected in the Lebanese Republic. Preliminary mechanical processing of the samples was carried out to obtain oil absorbers: drying, grinding to a particle size of up to 1.0 mm by dry mechanical grinding in a mill and fractionation of laboratory sieves. An input structural and mechanical analysis of the samples was performed: relative humidity, pH of the aqueous extract, bulk density were determined; the amount of substances soluble in cold and hot water and subjected to alkaline decomposition. The analysis of the adsorption capacity for iodine and methylene blue samples for the production of oil absorbers. The method of "molecular probes" determined the total pore volume. Performed by analysis of the microstructure of the samples. Oil absorption, water capacity, buoyancy, and the degree of extraction of oil absorbers were determined by the methods described in [1].

It has been established that it is promising and economically feasible to use large-tonnage cellulose- and lignin-containing wastes of the wood processing and agriculture of the Lebanese Republic as local, affordable and inexpensive sinks in the process of liquidating emergency oil spills of oil products (treatment, concentration and disposal) due to the following factors:

- the studied wastes are capillary -porous structure and they can be attributed to volume-porous absorbe;
- the moisture content in the samples does not exceed 5% wt., which indicates high ability to dry samples; potentiometric titration established that the water extract has a slightly acidic environment, and the bulk density of the samples averages 20 ... 70 g / 100 cm^3, which is comparable with industrial absorbers;
- the static contact angle of the studied samples with water is greater than 90°, which allows us to predict their good buoyancy and water-repellent properties;

- iodine adsorption activity of the studied samples, characterizing the volume of micropores (about 1 nm) and the ability to sorb relatively low molecular weight organics, is comparable to the industrially produced enterosorbent brand "Polyfam" (about 30%).

- adsorption activity by methylene blue, which allows us to judge the content in the sample of pores with effective diameters of 1.5 ... 1.7 nm is similar to that given for activated carbon (about 210 mg / g).The treatment of samples with water and alkali, in most cases, leads to an increase in adsorption activity for methylene blue due to the formation of additional pore sizes of 1.5 ... 1.7 nm;

-using the molecular probe method, it was established that the samples under study are characterized by highly developed total porosity (total pore water reaches 0.5 ... 6 cm^3/g) with a wide distribution of pore sizes. According to this indicator, the proposed absorbers are comparable with industrial analogues, the total volume for activated carbon is not less than 0.8 cm^3/g;

- the proposed samples for the production of oil scavengers are superior to the analogues used in industry, both in terms of some basic performance characteristics (oil absorption, moisture capacity, buoyancy, degree of extraction), and cost. For crop waste, the cost-effective sorption capacity of absorbers in the untreated form of more than 3.0 g / g for oil, base oil and diesel fuel has been established. Heavy oil products (for example, base oil) are absorbed by all samples much more efficiently than light products (for example, kerosene), which is associated with an increase in the adhesive bond energy of the sorbed substance with the sorption surface and differences in the physicochemical properties of these oil products.It is noted that the oil absorption of the waste under study correlates with the cellulose content in the sorbent. The higher the cellulose content in the sample, the greater the degree of absorption of the oil product;

- the results of the analysis of sorption ability showed that the studied samples are suitable for collecting spills of oil and oil products both in untreated form and their residues after processing the feedstock with water and a weak aqueous solution of alkali.

A rational method is proposed for the disposal of cellulose or lignin-containing wastes of the Lebanese Republic by obtaining oil scavengers, due to the ecological purity of the waste, a wide raw material base, and sufficient oil intensity at low cost, they can compete with industrial analogs, and their use will reduce the environmental burden and have an economic effect.

REFERENCES

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R. ISSAOUI
Institute for Technology Assessment and Systems Analysis

CRITICALITY OF PHOSPHATE FROM THE PERSPECTIVE OF EMERGING COUNTRIES: THE IMPLICATION OF SOCIAL AND ENVIRONMENTAL SITUATION OF MINING REGIONS

The first time the term critical appeared was prior to World War II in the Strategic and Critical Stock Piling Act of 1939 for the USA (National Research Council, 2008). The driver was the military needs. After that, the term appeared again after the oil crisis of the 80s, in the context of establishing the list of national critical materials. An update of criticality definition appeared in the late 2000s during the financial crisis. Thereby the (National Research Council, 2008) gave a broader definition to critical materials “to be critical, a mineral must be both essential in use and subject to supply restriction”.