

Report on the topic «Study of the process of isolation and purification of fulvic acids obtained from oxidized coal and the study of their biologically active properties»

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- Fulvic acid, one of two classes of natural acidic organic polymer that can be extracted from humus found in soil, sediment, or aquatic environments. Its name derives from Latin fulvus, indicating its yellow colour. This organic matter is soluble in strong acid ($\text{pH} = 1$). In terms of elemental composition, fulvic acids differ markedly from humic acids, primarily in their higher oxygen content and lower carbon content.
- The novelty of the research lies in the development of the scientific basis for the production of fulvic acid, in the optimization and finding of optimal conditions for the isolation and purification of FA from weathered oxidized coals of Kazakhstan.
- The global Fulvic Acid market was valued at US\$ 241.1 million in 2022 and is projected to reach US\$ 288.2 million by 2029, at a CAGR of 2.6% during the forecast period. Processing and purification of FA is quite an expensive process, the price for 1 mg starts at \$59 (US dollars).
- There is no industrial production of FA in Kazakhstan, they are forced to purchase abroad, mainly purchased from Russia, Japan, USA, China, etc. at inflated prices and today they amount to \$60-80 per 1 mg of FA. At the same time, Kazakhstan has all the natural and technical resources necessary for production. Well-established production of FA will provide the Republic of Kazakhstan with effective and inexpensive products of domestic production.
- The following bands are clearly visible in the IR spectrum of fulvic acid purified by the "Coconut" sorbent, obtained from potassium humate: 3000-3650 cm^{-1} (stretching vibrations of various OH groups), 1716 cm^{-1} (stretching vibrations of $\text{C}=\text{O}$), approximately 1620 cm^{-1} (stretching $\text{C}=\text{C}$), 1316 cm^{-1} O-C stretching), 1043 cm^{-1} (stretching vibrations of C-O in polysaccharides or polysaccharide-like substances), 821 cm^{-1} (out-of-plane deformation vibrations of C-H in a substituted aromatic)
- In the second case the number of terminal saturated hydrocarbon groups (1.05-1.60 ppm) and protons in the alpha position to aromatic and carbonyl groups (2.03-2.17) increases, and the number of protons of ester groups and in the alpha position to OH and OR groups decreases (range 3.0–4.0 ppm), while almost no changes compared to the original sample are observed in the aromatic region of the spectrum (6.90–9.00 ppm)
- The concentration of fulvic acid obtained from potassium humate after purification was 137 mg/l. The concentration of fulvic acid obtained from ammonium humate after purification was 117 mg/l. The concentration of fulvic acid obtained from potassium humate after purification was 120 mg/l. The concentration of fulvic acid obtained from ammonium humate after purification was 100 mg/l.
- Exposure to more naturally occurring organisms in the soil, such as fulvic acid, benefits: digestion, increased nutrient absorption, gut health, immunity, cognitive functioning, increased energy levels, protects us from infections, viruses, yeast and fungi, promoting skin health, slow.