DOI: 10.31081/1681-309X-2024-0-4-17-21 Specialty 161. U.D.C. 378.17:662.7

DETERMINATION OF THE pH INDICATOR AT THE POINT OF ZERO SURFACE CHARGE FOR LIGNITE HUMIC ACID

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Humic acids are a complex mixture of high molecular weight aromatic oxycarboxylic acids that act as polyelectrolytes. Their structure includes aromatic nuclei, side chains, and functional groups, resulting in a variation of physicochemical properties such as solubility and stability. Carboxylic and phenolic groups impart acidic properties, while amino groups cause amphotericity, which is related to the isoelectric point (pI). The amphiphilic character contributes to the formation of micelle-like structures in neutral and acidic environments. Humic acids form supramolecular colloids connected by hydrogen bonds. It is known that the pH at the zero charge point of different humic acids varies from 0.5 to 9.3, reflecting their chemical diversity.

In our experiments humic acids were obtained by alkaline extraction from lignite with a carbon content of 40.5% and an ash content of 40%. The zero charge point (the pH at which a molecule carries no net electrical charge or is electrically neutral in the statistical mean) was determined by two methods using a pH titration procedure. These methods showed quite close pH values (2.0 and 1.6) at which the surface of humic acid has a net zero surface charge. This allows us to have information about the protonation state and charge dynamics of humic acid under different pH conditions. The data obtained helps to determine the solubility of the acid depending on the pH of the medium, which is important at the stage of acid precipitation in the process of its production, because of the zero charge point value can affect the solubility of a molecule at a given pH.

Keywords: lignite, humic acids, composition, extraction, zero surface charge, pH indicator, acid-base titration.

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