SYNTHESIS AND CHARACTERIZATION OF GRAPHITE BISULFATE

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Graphite and various graphite compounds are widely used in the fields of science, technology, and industry. Particular attention is paid to graphite intercalation compounds (GICs) that are formed by the insertion of different atomic, molecular or ionic species between the layers in a graphite material [1].

These compounds exhibit excellent chemical and physical properties comparable to those of pristine graphite and are significantly relevant both theoretically and practically. They have found wide application as anode materials, heterogeneous catalysts, in production of superconductors, and in pyrophoric stabilization of reactants. Currently, GICs are also used in the preparation of graphite nanoplatelets, expandable graphite, and, most importantly, single-layer graphene [2,3].

Graphite bisulfate is a GIC with sulfate ions interposed between the graphite layers. This intercalate expands strongly when heated, which weakens the π-π interaction and then graphite layers can be easily separated. Depending on the degree of intercalation, graphite nanocrystals of different thicknesses can be obtained. To obtain a monolayer of graphene, the highest possible degree of intercalation is required, which depends on the type of oxidant and the experimental conditions [3].

The aim of this work was to investigate and compare graphite bisulfate compounds obtained by using different oxidizing agents. The synthesis of graphite bisulfate was carried out by intercalation of graphite in a mixture of H_2SO_4 and a selected oxidizer $(NH_4)_2S_2O_8$, $K_2S_2O_8$ and CrO_3 while P_2O_5 was used as a water binding agent.

Obtained products were investigated using several methods. Raman spectroscopy was used to determine the intercalation degree and defects of the products. FTIR analysis was carried out to identify the functional groups present in GICs. SEM images were acquired to evaluate and compare the surfaces of graphite and other specimens. Optical microscope images were obtained to examine the bright colour, which is characteristic to GICs. Results will be introduced in more detail during the poster presentation.

References

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