

Letter to the Editor

Nomenclature of Graphite Intercalation Compounds

Graphite reacts with many chemical substances to form compounds [1]. The best known class of graphite compounds, known as the intercalation compounds [2 - 6], contains the reactant (called the intercalate) in the interstitial spaces between the planar hexagonal layers of the graphite crystal and maintains the aromatic planar layer structure of the parent graphite. Since the 1950s the nomenclature of these compounds has differed from investigator to investigator. With the recent increased interest in graphite intercalation compounds the differences in nomenclature have resulted in misunderstanding and unnecessary conflicts in opinion among investigators. For example some investigators consider residue compounds as graphite intercalation compounds whereas some do not, and some investigators consider the covalent compounds such as graphite oxide as graphite intercalation compounds whereas some do not. The objective of this letter is to clear up the confusion in nomenclature by reviewing how the inventors of the terms define their terms.

"Crystal compounds" as used by Ubbelohde [7], "interstitial compounds" as used by Hennig [3], "intercalation compounds" as used by Rüdorff [4] and "lamellar compounds" as used by Riley [2] and Croft [5] all refer to those graphite compounds which have foreign species (intercalates) included in the interstitial spaces between the carbon layer planes such that the carbon layer structure of the graphite crystal is preserved. They do not include the graphite compounds in which the foreign species is adsorbed on the surface (called surface compounds [1]) and those in which the foreign species occupies substitutional sites in the graphite crystal structure (called substitutional compounds [1]). However, they include the compounds with ionic bonding such as the graphite-alkali metal compounds as well as the compounds with covalent bonding such as graphite oxide. They

also include the residue compounds, which retain the residue reactant after most of the reactant has been driven off.

The cause of the confusion is that some of the terms mentioned above have different meanings when they are used by an investigator other than the one linked above with that particular term. In contrast to Riley and Croft, Hennig used the term "lamellar compounds" to refer to those interstitial compounds which contain interstitial monolayers of the reactant in a characteristic distribution between the carbon layers, excluding the residue compounds and the "covalent" compounds.

In our work the term "intercalation compounds" has the meaning as used by Rüdorff and the term "lamellar compounds" has the meaning as used by Hennig, so that intercalation compounds include lamellar compounds as well as residue compounds and those with "ionic" bonding as well as those with "covalent" bonding.

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