Preparation and Thermal Expansion of Pyrolytic Graphite-Bromine Residual Compounds

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Abstract

Stable pyrolytic graphite-bromine residual compounds (PG(Br)) of various bromine concentrations (100.Br/C=0.3–12) were prepared using PG deposited at 1900, 2100 and 2300°C. Preparation conditions and the thermal expansion in the direction of the *c*-axis of these compounds are described. Up to 1000°C the general characteristics of the thermal expansion of these PG(Br) are similar to that of PG(Br) made from PG heat-treated at 3000°C, but the thermal expansion coefficient of PG(Br) varies with bromine concentration and the properties of the original PG. The experimental results are interpreted by the following model: Bromine in the PG(Br) is bonded to the carbon network ionically at room temperature, but begins to vaporise to make gaseous bubbles between graphite layer planes at higher temperatures. These bromine gas bubbles expand against internal stress according to the ideal gas law. Therefore an increase in the average *c*-spacing of PG(Br) results upon heating.

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