Phase Equilibria in the Cesium-Carbon Black System*

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ABSTRACT

The reactions of the alkali metals with natural, synthetic and pyrolytic graphites have been studied in some detail in recent years. Little quantitative information is available, however, on the reactions of the alkali metals with carbon blacks and charcoals.

In the present study, phase equilibria in the cesium-carbon black (Sterling MT-D-5, graphitized, Cabot Corporation) system was investigated at temperatures of 350-600°C and the data are compared to results obtained in the cesium-graphite system. A tracer technique was used to measure the cesium content of the carbon black as a function of the cesium pressure. A sharp rise in the cesium content with increasing pressure was observed at approximately the pressure which corresponded to the two-phase region

$$\frac{5}{7}\, C_{24}Cs(s) + Cs(g) \leftrightharpoons \frac{12}{7}\, C_{10}Cs(s)$$

in the cesium-graphite system. The highest composition achieved

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in the cesium-carbon black system corresponded to the formula C_8Cs, which is also the highest composition observed in the cesium-graphite system. The color of this composition was dark brown, whereas the color of C_8Cs in cesium-graphite is a metallic yellow color. The distinct two-phase region

$$4C_{10}Cs(s) + Cs(g) \rightleftharpoons 5C_8Cs(s)$$

found previously in the cesium-graphite system, was not observed in the cesium-carbon black system. Values are reported for the heats and entropies of reaction at various compositions and are compared to those observed in the cesium-graphite system.