

**STRUCTURAL CHARACTERISTICS OF
NATURAL GRAPHITE AND
SYNTHETIC GRAPHITE**

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by

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Abstract

Sri Lanka is famous for highly crystalline natural vein graphite. Bogala and Kahatagaha – Kolongaha are main graphite mines which are situated in the central highlands. Sri Lanka graphite has high purity carbon (more than 99% pure carbon in Kahatagaha - Kolongaha and 98% pure carbon in Bogala mine). At present graphite industry in Sri Lanka is mainly limited for pencil productions. High labor cost, expensive deep mining methods and high mining cost are main problems to decay production of graphite. Therefore currently Sri Lankan graphite is unable to compete in world market.

Currently synthetic graphite is used instead of natural graphite to produce different kinds of products. In the main, synthetic graphite is used for electrodes in lithium ion batteries, coatings etc. But in Sri Lanka, there are limited work has been done to study structural characteristics of graphite. When the graphite pieces convert to powders, large grinding hours are wanted to milling. As a result rhombohedral content is increasing gradually. Certain applications need rhombohedral phases rather than hexagonal phase. Therefore consider the rhombohedral phase of powder natural graphite important for further studies. The amount of rhombohedral percentage of graphite was calculated from X-ray diffractogramme which were plotted (Excel 2007) using XRD data by measuring height of the peaks of hexagonal (101) and rhombohedral (101) reflections.

Crystallographic parameters of the mechanical treated and untreated natural graphite are calculated using the hexagonal crystallographic formulae. The lengths of coherence (L_a and L_c) of graphite were calculated using XRD data. The L_c values were calculated on the basis of the d_{002} diffraction line, using the Sherrer's formula while the L_a values were calculated with the d_{100} diffraction line using the Warren's formula. (Parthasarathy *et.al*,2006) The different chemical impurities in Sri Lanka natural graphite were analyzed qualitatively. The average crystallographic parameter, 'c' is 6.732 Å and 'a' is 2.465 Å, for untreated natural graphite. According to the diffraction line of d_{100} the L_a average values of natural graphite vary between 63nm and 160nm. The L_c values of natural graphite vary between 40nm and 70 nm with respect to d_{002} diffraction line.