Analysis of Carbon and its Compounds in an Apollo 12 Sample

Abstract of a paper to be presented
at the Lunar Science Conference, Houston, Texas
January 1971

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Abstract. Total carbon in the Apollo 12 sample 12023 fines was 110 μg/g with a δ¹³C PDB value of +12 per mil. Hydrolysis of the fines with DCI yielded CH₄ along with deuterated hydrocarbons confirming the presence of 7 to 21 μg/g of carbon as carbide and about 2 μg/g of carbon as indigenous methane. By vacuum pyrolysis to 1100°C gases were detected in the relative abundance CO >> CO₂ > CH₄. Variations of δ¹³C value with pyrolysis temperature indicated the presence of carbon with more than one range of isotopic values. The observed δ¹³C PDB value of +14 per mil for lunar carbide is much higher than that of carbide in meteorites, suggesting that either it is indigenous to the moon or is a meteoritic contribution which has been highly fractionated isotopically.