

FROM PYRITE TO TROILITE

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Abstract Troilite (FeS), though rare on earth, is a common constituent of meteorite and lunar rocks. By means of an experimental comparison of native troilite and synthetic troilite, it is helpful to find out the origin of earth as well as the formation and evolutionary processes of the planets in the solar system. In this paper, troilite was synthesized by arc-discharge method with native pyrite source material used as a reactant, and then the synthetic troilite was examined by powder X-ray diffraction (XRD), TEM and SEM. Now, it is not doubted that at high temperature, pyrite could be decomposed to troilite, iron and sulfur easily. The reaction mechanics was defined as: $\text{FeS}_2 (\text{solid}) \rightarrow \text{FeS} (\text{solid}) + \text{Fe} (\text{solid}) + \text{S} (\text{gas})$. Since both pyrite and troilite exist stably in meteorites and lunar rocks in which they coexist with iron or iron-nickel alloys, the authors supposed that the native troilite in meteorites and lunar rocks might be formed under the lightning discharge model from pyrite, which could be earlier formed formation of at low nebular temperature (900K) during the condensation of solar nebular. The formation of pyrite could be determined as: $\text{Fe} (\text{solid}) + \text{H}_2\text{S} (\text{gas}) \rightarrow \text{FeS}_2 (\text{solid}) + \text{H}_2 (\text{gas})$. Further research needs to be conducted to found out more appropriate evidences to support this hypothesis. **Keywords:** Native pyrite, Synthetic troilite, Hypothesis, The origin of earth.