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Anomalous optical properties of fibrous tremolite, actinolite, and ferro-actinolite

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ABSTRACT

The fibrillar growth habit and {100} twinning of fibrous amphiboles tend to produce anomalous optical properties. Commercial amosite and crocidolite always exhibit uniaxial-like optical properties including parallel extinction and two principal indices of refraction. Fibrous members of the actinolite series, however, exhibit a range in optical properties from normal to anomalous. The types of anomalous optical properties that can be displayed by asbestiform members of the actinolite series are described based on a study of twelve samples. One sample displays uniaxial-like properties, nine display partial development of uniaxial-like properties, and two contain fibers with both orthorhombic and monoclinic optical properties. "Byssolitic" samples of the actinolite series, a fibrous non-asbestiform habit, contain fibers that do not go to extinction in sections on or near (010), probably as a result of {100} twinning. Although anomalous optical properties may confound the identification of fibrous amphiboles, in most cases the refractive indices are predictable and can be used for identification. Because of the range in optical properties, especially extinction angle, reliance solely on parallel extinction to distinguish asbestos from non-asbestiform varieties is not recommended. The fibrillar structure, however, remains the hallmark of the asbestiform habit.