



Demonstration that Fe-sulphate, but not Al, K, Mg-sulphate solutions turn black when mixed with red pomegranate juice. Melian alunogen solution (with trace iron) also turns black.

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### Abstract

Industrial Minerals in Antiquity are represented by a host of chemicals, minerals and rocks which played an important role in domestic and industrial life. Pliny (1st Century AD) stated that Melian "alumen" was the best and could be tested using pomegranate juice. As a typical IM it had many uses including medical applications, 38 for different varieties of alumen.. Our research, which forms part of a project on IMs in Antiquity in the Aegean, is endeavouring to establish the nature, origin and sources of Melian alumen as well as methods used in its extraction and processing. Melian alumen was probably an efflorescent salt, an aluminium-sulphate mineral (alunogen), which formed at sulphurous fumaroles in the post-volcanic but geothermally active landscape of Melos. It could have been recovered on the surface or underground in 'mines'. Samples of Melian efflorescences can be quite pure or they can contain a variety of salts, determined by XRD. Fractional crystallisation in solution could have been used in Roman times to purify the alumen. Melian alunogen contains impurities including iron (confirmed by ICP-AES) and this can be detected using pomegranate juice. We assume that the iron content decreased the quality of the alumen but it is not yet clear to which application this would pertain. While the 'alum' group has many modern day applications, including enhancing vaccines, its properties, especially medical, are not fully understood. Astringency of aluminium salts is probably of major significance in many of the early medical uses of alunogen.