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## Mineralogy of Non-sulphid ore from the Mehdi Abad zinc-lead deposit, Central Iran

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**Abstract:** The Mehdi Abad zinc-lead deposit, which is located in central Iran, is one of the largest zinc deposits of the region. The orebody consists of primary sulphide as well as supergene non-sulphide ore. The deposit comprises a main sulphide/non-sulphide orebody below a valley floor and of the so-called Calamine Mine (exclusively non-sulphides), on the flank of a mountain, separated by faults from the former. The non-sulphide ore of the Calamine Mine is hosted within Cretaceous (Albian) strata of the regional Abkou Formation, and occurs as a matrix of fault- and karst breccias. Ore minerals are composed of hemimorphite, hydrozincite, smithsonite, goethite, as well as small amounts of mimetite, hetaerolite, and sauconite. Texturally, hemimorphite occurs as two different types. Type-1 displays sub- to anhedral shapes and is commonly associated with goethite and/or hydrozincite. This type-1 hemimorphite is commonly altered and partly dissolved to relict box work textures on a microscopic scale. Type-2 hemimorphite is euhedral and has grown in fractures and open spaces of the host rock and in breccias. At least three different stages are proposed for the genesis of the hemimorphite mineralisation: (i) formation of type-1 hemimorphite from supergene ore fluids, (ii) the partial dissolution and alteration of type-1 hemimorphite to hydrozincite, probably accompanied by the precipitation of goethite due to a change in Eh-pH conditions, and finally (iii) the precipitation of type-2 hemimorphite within fractures and open spaces.

**Keywords:** Calamine, Non-sulphide, Zinc, Oxidation, Supergene, Hemimorphite, Alteration.