

Compositions of Silver Halides from the Broken Hill District, New South Wales

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ABSTRACT. Some 320 specimens of silver halides from the Broken Hill field, New South Wales, held in the collections of the Australian Museum have been examined. On the basis of colour and habit variations, 42 specimens were selected for analysis. Contrary to previous suggestions, compositions of individual specimens are highly variable and reflect a complex crystallisation history. Bromargyrite has been detected for the first time away from the Broken Hill main lode horizon. Compositions are discussed in terms of the lacunar nature of the appropriate phase diagrams; natural material is shown to reflect compositions of synthetic phases prepared at about 25°C. No obvious relationship between composition and physical properties could be detected for the chlorargyrite-bromargyrite series. This highlights the difficulties of visual identifications.

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The Broken Hill orebody is one of the world's greatest silver-lead-zinc deposits, yet the details of the formation of its oxidised zone are sketchy. The deposit is renowned for its silver halide minerals, which formed the basis of the deposits wealth in its early years. Considerable amounts of bromide and iodide minerals are present, but their extent and relationships to the more common mineral chlorargyrite, AgCl, are not well described. The present work was undertaken to rectify this gap in our knowledge, as part of a larger research programme aimed at developing a fuller understanding of the

chemical processes responsible for mineral formation in supergene base metal ores. It is hoped that this will lead to new exploration methods for such deposits and to better extraction processes.

Noteworthy silver halide minerals at Broken Hill, NSW, appear in the oxidised sections of the main lode horizon (Birch *et al.*, 1982; Liversidge, 1886, 1891, 1894; Prior & Spencer, 1902; Smith, 1926) in the Consols Mine (Plimer, 1982) and in the many small silver mines scattered throughout the Broken Hill Block (Stevens, 1980). All three halides were represented in

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