

## Integrated treatment of acid mine drainage using cryptocrystalline magnesite and barium chloride

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### ABSTRACT:

This study endeavours to report the efficiency of a hybrid approach in the treatment of acid mine drainage. Cryptocrystalline magnesite was used to pre-treat acid mine drainage and barium chloride was used to remove the residual sulphate through the formation of barium sulphate. Batch experimental approach was adopted and the documented optimum conditions for both cryptocrystalline magnesite and barium salts were used. This was 60 mins for pre-treatment and 60 mins for polishing the residual sulphate. Water quality was assessed using ICP-MS and IC. Mineralogical composition was done using XRD, elemental composition with XRF, morphology with SEM and transmission electron microscope. Magnesite removed >99% of heavy metal species and 40% sulphate except for base cations. Barium managed to remove 99% of residual sulphate from an aqueous system. This indicate that the water meet the industrial, discharge and irrigation standards as stipulated by the water quality guidelines. As such, it can be concluded that this integrated approach can be used to treat acid mine drainage to useable standards as defined in the water quality guidelines. This will be a pragmatic approach for mining houses to curtail the impact of acid mine drainage by using natural and locally available materials such as cryptocrystalline magnesite and polish the water with barium salts.