



Chemistry of Iron Ferrites and Their Application for Wastewater and Acid Mine Water Treatment[#]

James D. Navratil*

Hazen Research, Inc. 4601 Indiana St. Golden, Colorado 80403 USA

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Abstract: Iron ferrites and magnetite have been used for the removal of radioactive and heavy metals from liquid effluents. The mineral magnetite, or synthetically prepared iron ferrite ($\text{FeO} \cdot \text{Fe}_2\text{O}_3$), is typically used. Iron ferrite can be employed for wastewater or acid mine water treatment in a batch mode by adding preformed ferrite to the solution or by preparing the ferrite in situ, thus using the existing iron in the effluent. Natural magnetite can also be used in a batch mode, or better, in a column mode. In the presence of an external magnetic field, enhanced capacity was observed when using a column of supported magnetite for removal of actinides and heavy metals from wastewater. The enhanced capacity is thought to be primarily due to magnetic separation of colloidal and submicron particles along with some complex and ion exchange sorption mechanisms. The loaded magnetite can easily be regenerated by removing the magnetic field and using a regenerating solution. This paper will review the metal separation chemistry of iron ferrites and magnetite and present new results on using magnetite and iron ferrites for the effective treatment of several different acid mine waters and for valuable metal recovery.

Keywords: *Iron ferrites, liquid effluent treatment, magnetite, wastewater treatment*

* Corresponding: Email: nav@hazenresearch.com; Tel: 303-279-4501; ext. 292; Fax 303-278-1528

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