REMOVAL MECHANISM OF PHOSPHATE SULFATE AND COLOR ON FELDSPAR

A PROJECT REPORT PRESENTED BY

SUBASHINI KANDASAMY

to the Board of Study in Environmental Science of the

POSTGRADUATE INSTITUTE OF SCIENCE

in partial fulfillment of the requirement

for the award of the degree of

MASTER OF SCIENCE IN ENVIRONMENTAL SCIENCE

of the

UNIVERSITY OF PERADENIYA

SRI LANKA

2006

REMOVAL MECHANISM OF PHOSPHATE SULFATE AND COLOR ON FELDSPAR

SUBASHINI KANDASAMY

Department of Chemistry

University of Peradeniya

Peradeniya

Sri Lanka

The increase of population and new technology are constantly intensifying environmental pollution. Pollution due to metal ions, color substances and anions causes serious threats on human health. This problem can be reduced by using suitable substances with an adsorption ability of pollutants.

In the present study, adsorption of laboratory prepared phosphate (KH_2PO_4) was analyzed using colorimetric method. Sulfate removal was analyzed by turbidity method for laboratory prepared solutions of Na_2SO_4. In this regard, the introduction of natural substances showed numerous advantages over the conventional chemical methods. It was found that the feldspar, among many natural substances such as kaolinite, dolomite and brick, offers significant removal ability for sulfate, phosphate and colored substances.

Optimization of experiment parameters such as solution pH and flow rate revealed that the maximum removal efficiency of phosphate, sulfate and color about 50%, 41 % and 100% respectively.

Adsorption characteristics of feldspar were carried out by the study of mineralogy and crystallography. By which, feldspar structure can be explained as follows. The mineral feldspar is formed by the basic tetrahedral units of silicon tetra-oxide. A ring structure of feldspar is framed by the addition of each tetrahedral structure of silicon tetra-oxide through the oxygen bridge. Larger voids in the feldspar structure favor the addition of larger cations such as K^+, Ca^{2+} and Na^+ and may be lead ions, rubidium ions and cesium ions. All the cations in the feldspar cavity arranged in octahedral manner. Aluminum substitution in the tetrahedral sites of the feldspar favors because of the similar ionic radii and relatively high abundance of the aluminum in minerals. Crystal patterns of the feldspar favor the occupation of phosphates, sulfates and colors in the suitable interstices. Non-stoichiometry, molecular orbital patterns of the centre, relative covalence, and impurity in the mineral may also facilitate the adsorption process of pollutants in the feldspar surface.