

Cadmium Removal from Phosphates of Djebel-ONK by Thermal Treatments

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In this work, the calcination of Algerian phosphate by microwave radiation is studied. Obtained results show that the dielectric constants, ξ' and ξ'' , of these phosphates over the frequency range from 2.4 GHz to 3.65 GHz, were in order of 3.6 and 0.36, respectively, which could be considered as admissible values for applying microwave radiation on phosphate rock calcinations. Applying the microwave radiation on phosphate calcinations at laboratory scale allowed to reduce the concentration of cadmium down to 12 mg/kg and increase the P_2O_5 content up to 36.82%.

Key Words: Phosphate ore, Phosphoric fertilizers, Cadmium, Soil contamination.

INTRODUCTION

Commercial phosphate fertilizers contain small amounts of heavy metal contaminants originated from phosphate rocks. These heavy metals may accumulate in soil and plants with repeated fertilizer applications and may end up in the food chain.

It is known that cadmium is the heavy metal of highest toxicity and so its presence in the fertilizer could be a source of environmental pollution. In this respect various methods have been proposed for its elimination from the phosphate rock. Analyzing the calcination process of Algerian phosphate in fluidized-bed calcinators shows an increase in the P_2O_5 content from about 25% up to 35% and a decrease in the Cd concentration down to 12 mg/kg, which is considered as admissible but with very high cost and overall yield of about 50%.

During phosphate industrial processing 60–80% of the cadmium value in phosphate rocks passes into the fertilizer. Depending on the origin and the type of rock, the cadmium content varies from 0.15–5 ppm in rocks of volcanic origin to 5–300 ppm in sedimentary rocks¹. Furthermore, sedimentary ores represent about 96% of world reserves and supply about 79–80% of market concentrates². As the sedimentary rock with 28 ppm is used in Algeria for producing fertilizers, it could be a potential source of environmental pollution by cadmium.

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