

Thesis Title Sulfur and Ash Removal from Coal via Hydrogen
 peroxide Solution.

Name Mr. Ekachai Ahnonkitpanit

Thesis Advisor Assistant Professor Pattarapan Prasassarakich,
 Ph.D.

Department Chemical Technology

Academic Year 1986

ABSTRACT

Due to the importance of coal as natural resource, coal cleaning is method to decrease sulfur and ash prior to combustion which can reduce pollutants during combustion. The desulfurization of coal using hydrogen peroxide solution in a batch stirred tank reactor was studied. The suitable conditions for desulfurization of coal from Mae-Moh mine, were as follows; 10-15% W/V hydrogen peroxide/0.1 N sulfuric acid, particle size of coal < 250 μm , temperature 25-30°C, rate of agitation 1000-1200 rpm., loading 30 gm coal/300 ml. solution (1:10) for 1-1½ hr. and the results were, 48.82% total sulfur reduction, 84.28% sulfate sulfur reduction, 97.30% pyritic sulfur reduction, 9.50% organic sulfur reduction, 68.81% ash reduction and 11.69% heating value increase. For the desulfurization of coal, it was found that the rate of pyrite oxidation was second-order, the rate of pyrite reaction was controlled by the diffusion through product layer. When the rate constants for pyrite reaction (k_2) and effective diffusivity (D_e) were as follows

For Mae-Moh coal

$$k_2 = 12.02 \times 10^6 \exp (-52.61 \times 10^6 / RT)$$

$$De = 1.78 \times 10^{-5} \exp (-33.22 \times 10^6 / RT)$$

For Pa-Ka coal

$$k_2 = 3.88 \times 10^6 \exp (-49.71 \times 10^6 / RT)$$

$$De = 1.15 \times 10^{-5} \exp (-33.09 \times 10^6 / RT)$$