**Optimization of the calcination of brucite for the production of magnesia using response surface methodology**

**Abstract**

An environmentally friendly pathway and an alternative raw material for the synthesis of MgO from brucite (produced from dolomite) using pentagonal experimental design under response surface methodology was investigated. The variables considered for the calcination include temperature between 510 and 890 °C and time between 13 and 40 min. Analysis of variance (ANOVA) shows that the developed model in this study is significant with a P-value of 0.0328, a high correlation coefficient (R2) value of 0.9988, and an adjusted R2 of 0.9957. According to XRD analysis, the periclase/magnesia (MgO) mineral phase has the most prominent peaks, while XRF analysis recorded the highest MgO of 72.72% at the optimum process conditions of 700 °C for 25 min. The MgO produced is categorized as reactive, it can therefore be used for waste water treatment, production of fertilizer, manufacturing of chemicals. Dolomite is a suitable alternative for the production of MgO.