THE EFFECT OF THE PRESENCE OF A METAL OXIDE ON THE OXIDATION OF ALUMINIUM AT 1000°C

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ABSTRACT

This work reports a study on the effect of the presence of three metal oxides on the oxidation of aluminium powder at 1000°C. The raw materials used for the study were aluminium, $\alpha$Al$_2$O$_3$, TiO$_2$ and MgO. Aluminium powders were mixed with each metal oxide at weight composition of 50:50. The mixtures were cylindrically pressed and then heated at 1000°C for two hours. XRD data showed that different oxidation results were obtained for each oxide. Analysis using HighScorePlus software showed that the presence of TiO$_2$ is more effective in reducing oxidation of aluminium, being the aluminium residue was about 16% compared to 5% when no metal oxides present, followed by $\alpha$Al$_2$O$_3$ (14%). The presence of MgO, however, causes complete oxidation of aluminium by forming spinel, MgAl$_2$O$_4$. The study also showed use of HighScorePlus for the analysis gave more reliable results than use of Rietica.

Keyword : Oxidation of aluminium, $\alpha$Al$_2$O$_3$, TiO$_2$ and MgO, XRD, HighScorePlus, Rietica.