

Abstract Submitted  
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**Thermal behaviour of Fe<sub>2</sub>O<sub>3</sub>/Al thermite mixtures in air and vacuum environments** LUISA DURAES, Dept of Chem Engr, Univ of Coimbra, Polo II, 3030 Coimbra, Portugal, REGINA SANTOS, ANTONIO CORREIA, Centro Tecn Ceramica Vidro, R Cor Veiga Simao, 3020 Coimbra, Portugal, JOSE CAMPOS, Dept of Mech Engr, Univ of Coimbra, Polo II, 3030 Coimbra, Portugal, ANTONIO PORTUGAL, Dept of Chem Engr, Univ of Coimbra, Polo II, 3030 Coimbra, Portugal — The thermal behaviour of Fe<sub>2</sub>O<sub>3</sub>/Al thermite mixtures, when heated in air and vacuum, is studied. Individual reactants and three mixtures - stoichiometric and over aluminized - are tested, by Simultaneous Thermal Analysis (STA) and heating microscopy with a heating rate of 10 C/min. The end temperatures were 1500 C and 1400 C, respectively. The STA results show that the presence of O<sub>2</sub>, from environmental air, or from residual air in vacuum experiments, determines the occurring reactions. The Al oxidation by this oxygen is extensive making the thermite reaction with Fe<sub>2</sub>O<sub>3</sub> unviable. There is evidence of significant conversion of the Fe<sub>2</sub>O<sub>3</sub> into Fe<sub>3</sub>O<sub>4</sub>, near the end temperature, which support the previous conclusion. Therefore, the STA curves for the three mixtures are similar and all display features of the individual reactants curves. The heating microscopy images confirm the STA conclusions, with one exception: the thermal explosion of the Al sample close to 550 C. The absence of this phenomenon in STA results is explained by the limited amount of material used in each sample.

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