

**THERMOCHEMICAL EFFECTS OF THE POWDERED IRON – GRAPHITE –  
ALUMOSILICATE MIXTURE IN PRESENCE OF OXYGEN**

Kravchenko A. V., Pershina K. D.

Inter-Agency Department of Electrochemical Energy Systems National Academy of Sciences  
of Ukraine, 38a Vernadsky Avenue, Kiev, 03680 Ukraine

katherinepersn@gmail.com

The interaction between natural aluminosilicate, iron powder and iron oxides in the self-heating chemical mixtures containing graphite and a mixture of iron oxides was studied using DTG analysis in inert atmosphere and in presence of oxygen. The thermochemical changes in inert conditions (atmosphere of He) of the investigated objects have shown that iron and metastable compounds regulate the implementation of oxidative exothermic reaction in such way:  $\text{Fe} \rightarrow \text{FeO} \rightarrow \text{Fe}_3\text{O}_4$  ( $\text{FeO} \cdot \text{Fe}_2\text{O}_3$ ) in the wide temperature range (19–80 °C) (fig. 1).

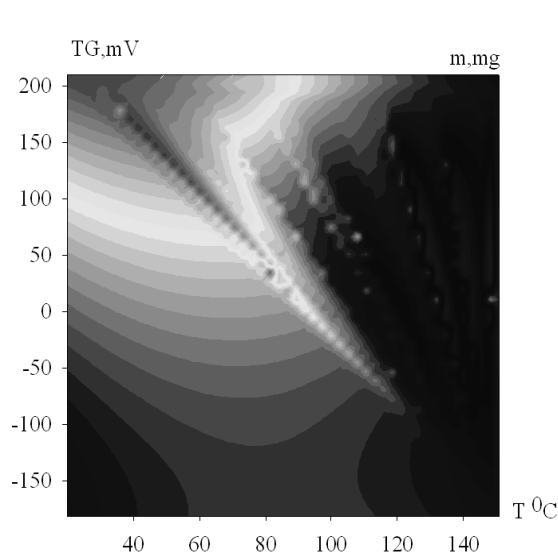


Fig. 1. Energy map of the thermochemical reaction in the atmosphere of He

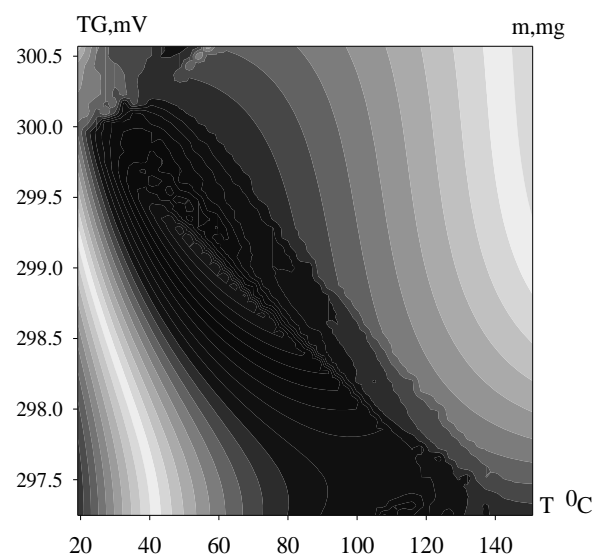


Fig. 2. Energy map of the thermochemical reaction in the presence of oxygen

The presence of oxygen blocks the bulk exothermic reaction due the high surface activity of the metastable iron oxides. In this case the stable  $\text{Fe}_2\text{O}_3$  were formed. Formation of such structures on the wustite surface decreased the temperature range of the exothermic reaction. It became 20–32 °C (fig. 2).