

OXIDATION KINETICS OF CARBIDE BK8 BY THERMALLY PROCESSED AT SOLAR FURNACE

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Disposal of waste and energy saving - actual problems of modern engineering. The paper considers the development of the oxidation process of the wolfram-cobalt BK8 alloy compact sample in air at heat by concentrated radiant energy solar thermal SGU-7 and optical "Uran-1" furnaces. The obtained data are necessary for the development and optimization of technological processes of thermochemical processing of compact composite in heterogeneous systems gas - solid with a view to regeneration, extraction of the constituent elements of the production waste or from the breakdown products of multi- materials. Study of the kinetic composite mass transformations performed using periodical weighing the sample. Experiments were carried out on impact of radiant energy on the sample surface.

Fig. 1 shows the degree of oxidation (α) BK8 carbide of mass 28.7759 g depending on time in air and in the temperature range 900-1000 °C.

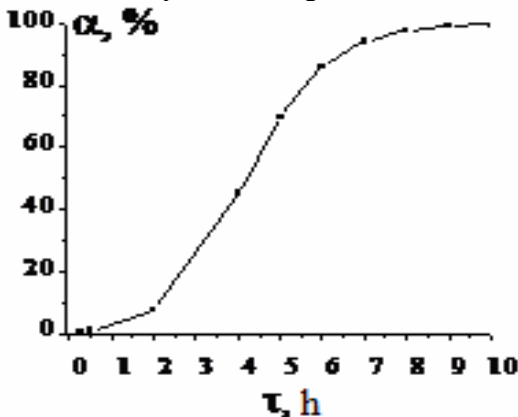


Fig. 1 The dependence on time of the BK8 oxidation degree in the temperature range 900 - 1000 °C

Kinetic data was obtained for the oxidation process. Depending $\alpha = f(\tau)$ has a sigma-type character that characterizes a complex physico-chemical process.

Fig. 2 shows the pattern of the sample BK8 destruction.



Fig. 2 Changes in the morphology of the sample, depending on the time of exposure to radiant energy at the 900 - 1000 °C: 1 – initial sample; 2 - 1 hour; 3 - 3.5 hours; 4 - 6 h exposure; 5 – form of final products of sample oxidation after grinding in a mortar

Appear depending of the process on the elements chemical activity, the diffusion step and stage of mechanical failure associated with bulk crystallographic misfit of oxides formed. Occurs serial sectional converting of the starting material with the formation of an intermediate oxide as WO_2 , $WO_{2.72}$, $WO_{2.9}$ and the end WO_3 . Heating the sample in the optical furnace was conducted outdoors and under the action of conventional ventilation. In experiments on solar thermal system a tubular quartz reactor was used with natural air convection. In this case, the traces of sublimation of tungsten trioxide with the sample surface in the form of spots condensation of characteristic yellow- green color were observed on the wall of the quartz tube outside the hot working zone of the reactor.

Despite some methodological differences, the qualitatively identical kinetic data were obtained on both plants about the development stages of the physico- chemical interaction between composite and oxygen of ambient air at temperatures up to 1000 °C. The mechanism of destruction of the compact sample in the initial and subsequent stages of transformation in the temperature range up to 1000 °C was examined.