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Reverse Interaction of Phosphorus and Calcium Oxide

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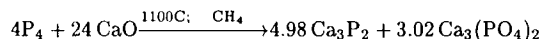
Reverse Interaction of Phosphorus and Calcium Oxide

VALENTIN V. OSHCHAPOVSKY^a and DMITRI I. KRYKLYVY^b

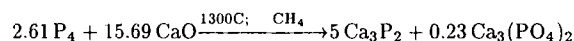
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In the framework of heterogeneous Gas – Solid system the high-temperature reduction of calcium orthophosphate by methane was studied. The braking action of CaO in the velocity of process, which lies in diffusion area and is described by Ginstling-Brownshtein's equation, was discovered. The kinetic parameters of reaction was calculated. The reverse reaction of interaction of CaO and phosphorus in the atmosphere of reducer-methane at the temperature 1100 – 1300°C was studied for clearing up of influence of the liberating calcium oxide on the kinetics of P-formation. It was established by chemical and physico-chemical methods that the phosphorus and CaO react between themselves stoichiometrically at the temperature 1100°C with the formation of calcium orthophosphate and phosphide according to the reaction:



Under the temperature rise, when formed $Ca_3(PO_4)_2$ is reduced by methane, the evolution of stoichiometrical proportions was observed to:



The limiting role of accumulation of CaO, which hinders the extraction of phosphorus from reaction zone, was proved. The conclusion about possible mechanism of process of $Ca_3(PO_4)_2$ reduction was made.

Keywords: calcium orthophosphate; reduction; methane; phosphorus; calcium oxide; mechanism