## BOOK REVIEWS

A. V. Borodulya

# HIGH-TEMPERATURE PROCESSES IN ELECTROTHERMAL FLUIDIZED BEDS*

Reviewed by V. K. Kashirskii

Fluidization theory has been widely developed in the USSR and elsewhere during the past twenty years, and various heat-exchange devices using fluidized beds have been widely employed.

Novel devices for firing and drying powdery materials represent a major technical advance in the chemical industry, metallurgy, and the production of building materials.

Industrial use is now made of fluidized-bed devices, but most of these do not work above 1200-1400°C.

Borodulya's book deals with researches on fluidized beds of conducting particles or binary mixtures carrying currents; temperatures up to 3000°C are obtainable in such beds, which provides the basis for new high-temperature processes in metallurgy and chemistry.

The book gives considerable data on the electrical properties of such beds, as well as on the trends in heat transfer; novel methods have been developed at the Institute of Heat and Mass Transfer, Academy of Sciences of the Belorussian SSR, and have been used to determine the basic electrical and thermal characteristics of such beds.

The methods described in Borodulya's book should find considerable use elsewhere. Much of the book deals with the prospects for using such beds for accelerating heat treatment of metals, together with the design principles for new processes to utilize the advantages of this method of producing high temperatures.

The author surveys results on the thermal treatment of various steels in such beds and shows that the accelerated diffusion is due to the activation of the carburizing agent in the microscopic arcs at the surface.

The reagent activation in these arcs provides good scope for very rapid processing of hydrocarbon raw materials to produce olefins and acetylene, as well as to decompose hydrocarbons to hydrogen and carbon.

The book deals with the latest techniques for producing carbon disulfide in such beds, together with much supporting laboratory and pilot-plant evidence.

A valuable feature of this book is the very full listing and survey of Soviet and other publications on the theory and practice of such beds.

Some deficiency must be reported, however, in the chapter concerned with wear and loss of bed material.

It would seem that the microscopic discharges and high-temperature pulses produce additional thermal stresses in the particles, which can cause surface damage. The wear on the solid fluidized phase in the bed is then quite substantial, and the aspect requires detailed research.

The book is the first major work on this topic; it should prove of substantial assistance to many technologists, particularly those whose efforts are directed to the introduction of advanced high-temperature processes.

* Nauka i Tekhnika, Minsk (1973).

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