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Thermodynamics and vapourization of Cs-, Sr-, Ba-containing oxide systems valid for nuclear safety problems RCR5059

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The review provides a systematic analysis of the studies carried out mainly in the last decade in which the thermodynamic properties and vapourization of the systems containing cesium, strontium, and barium were studied by high-temperature mass spectrometry. Such systems are of particular interest for considering the problems of environmental safety in the nuclear power industry. Particular attention is paid to the issues of reliable identification of the content of the gaseous phase over oxide systems, which are important in various high-temperature technologies, including the disposal of radioactive waste, reprocessing of nuclear fuel, as well as ensuring the safe operation of nuclear power plants. A discussion and comparison of thermodynamic data found in the literature for the systems under consideration in a wide temperature range were also carried out featuring the main advantages of the Knudsen mass spectrometric effusion method.

Bibliography — 117 references.

Photosynthetic microbial fuel cells: practical applications of electron transfer chains RCR5073

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Membrane electron transfer underlies the central metabolic pathways for energy conversion. The photosynthetic and respiratory electron transport chains are complex apparatuses capable of generating a transmembrane proton gradient from sunlight or chemical energy. Recent exploitation of these apparatuses as energy convertors is of interest due to the availability and eco-friendliness of the biomaterial. Devices that utilize chemotrophic microorganisms to generate electricity have been known for over one hundred years. In these systems, called microbial fuel cells (MFC), one or more microorganisms catalyze charge transfer from a consumable substrate (acetate, glucose, *etc.*) to the electrode. New MFCs integrating solar energy convertors based on the photosynthetic organisms have been developed. These devices, called photosynthetic microbial fuel cells (PMFC), still resemble the conventional MFC in that they also use living microbial cells to convert chemicals to electrical energy. However, the distinction between these two classes of fuel cells is that the MFC utilizes only the chemical energy of the organic substrate. At the same time, PMFCs are also capable of using solar energy. Common to both devices is the ability to utilize intrinsic electron transfer chains of bacterial metabolism as the primary mechanism of energy conversion. The widespread and accessible solar energy may permit PMFCs based on photosynthesis to become an inexpensive and efficient method for sunlight conversion. MFCs based on heterotrophs may be more promising in wastewater remediation and other ecological applications. This article reviews the latest advances in this field and emphasizes the remaining challenges.

Bibliography — 205 references.