

Short Reports

THE COMPUTERIZATION OF THE SILICON OXYGEN REFINING

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Russia has joined the Bologna process for closer relations and harmonization of educational system of European countries with the purpose of creating the single European higher education space. Since 2011 Russian institutes of higher education has passed on to two-level system.

It results from modern requirements to specialists' training that traditional methods of education, which aren't practically oriented to creative thinking and independent work of students, do not ensure required intensity and effectiveness of educational

process. That's why the problems of introduction of modern pedagogical technologies, firstly informational ones, which are intended for graduate students' training's quality increasing, for development of their creative activity and independence, are put in the forefront.

Using of computer programs during the educational process for bachelors' and specialists' of technical chief subjects preparation, in particular «metallurgy» school, allows student to clearly imagine processes, basic metallurgy equipment and technology in general.

We have developed and introduced to educational process a computer program «Calculating program of material balance of the silicon oxygen refining (RefOxSi)» (Certificate № 2012618462, Russian Federation [1]) (Fig. 1).



Fig. 1. Active windows of «RefOxSi» program

The process of silicon oxygen refining occurs at extremely high temperatures (1500–1600°C) [2]. That's why it's impossible to retrace its peculiarities in real time and research the mechanisms of impurity inclusions' forming with the use of traditional analysis and control methods. Computer program allow to «carry out» silicon refining virtually and to calculate the composition of resultant product knowing the composition of primary product and process' conditions.

While researching the process of silicon refining with the use of this program students get

introduced to all phases of the process, study its thermodynamics, also they can design their own process of silicon's purification and receive final results, estimating the effectiveness of refining.

Also for more deep study of metallurgical silicon refining process the program has reference information about slags and impurities, which are found at the technical silicon refining, it allows to find necessary information about certain impurity's behavior in melt (Fig. 2).

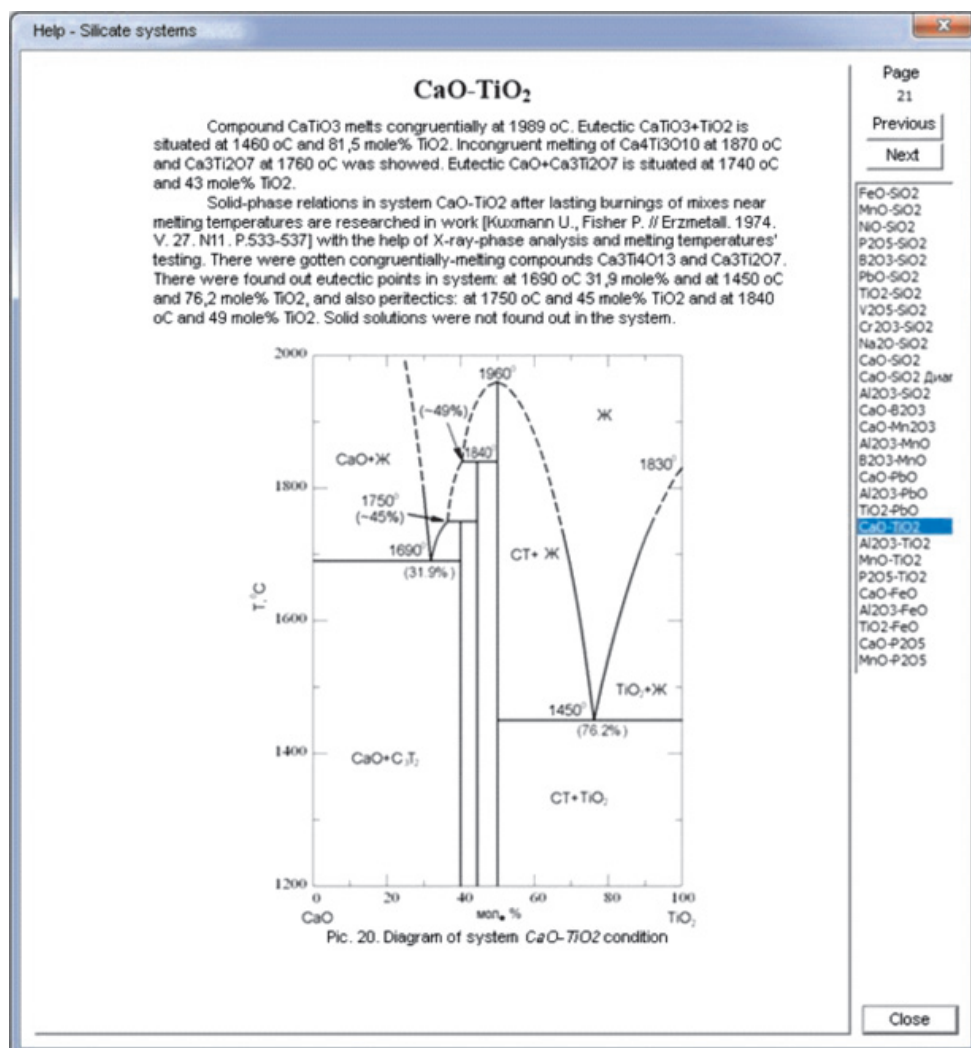


Fig. 2. Reference information about silicate systems of «RefOxSi» program

Thereby, using only computer program, one can not only calculate material balance of refining process, but also find out the composition of every slag, and also retrace an interaction of all components.

References

1. Certificate N2012618462, Russian Federation, Calculating program of material balance of the silicon oxygen re-

fining (RefOxSi) / N.V. Nemchinova, A.A. Tutryn; patentee and patent holder Federal State Budgetary Educational Institution of Higher Professional Education Irkutsk State Technical University. – 2012616166, patented 18.07.2012; published 18.09.2012.

2. Nemchinova N.V., Klets V.E. Silicon: properties, formation, application. Educational manual. – Irkutsk: Publishing of Irkutsk State Technical University, 2008. – 272 p.