

**DESIGN OF THE HIGH TEMPERATURE CENTRIFUGE MEASURING CELL
USING THE ULTRASONIC METHOD FOR STUDING
THE METALLES SEGREGATION IN THE MODEL PLANETARY MELT**

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During modeling of possible mechanisms of metallic core formation of the Moon the most difficulties are associated with accumulation and migration of the iron-sulfide phases at the partial fusion of a model planetary melt (olivine-picrite mixtures). Experiments were carried out in a high-temperature centrifuge at 1400-1460°C under normal pressure and in controlling of the oxygen fugacity. The studied was composed the mixture of: 85 wt.%Ol, 10 wt.%Pic, 5 wt.% FeS (95 wt.% Fe and 5 wt.%S). Experimental results showed, that mixture consisting of olivine crystals, silicate and iron-sulfide melts, after being separated in a centrifuge, is partly differentiated in density at high basic conditions at 1450°C. The oxygen fugacity is $\log pO_2 = \sim -11.5$. However, there are some problems with accumulation and segregation of metallic phases. One special device or “analytical complex” in which the melt shall be affected simultaneously by centrifugal forces and ultrasonic vibration was elaborated.

In some contemporary device this effect is used to realize the phase segregation. For iron-sulfide phase accumulation in melt was used the 35 kGc ultrasonic transducer, disposed out of the centrifuge. Experimental results showed, that was observed a partial accumulation of metal. For example, the result of experiment was showed of US-2.

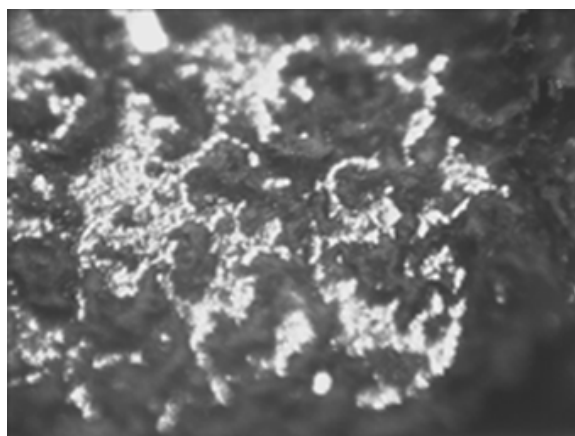


Fig.1. (No US). Distribution of phases of the specimen after influence of ultrasonic vibration (out of the centrifuge) of the mixture with: 85 %Ol; 10%Pic; 5%Fe; 5%S (from Fe); T=1430°C; t=15 min. Capsule – ZrO₂; oxygen fugacity $\lg PO_2 \sim -11.5$

It is necessary to promote the process of model's segregation of metal by adding to centrifugal force the effect of ultrasonic vibration. At the present we elaborate the special equipment for high-temperature centrifuge producing low frequency ultrasonic vibration. The main goal of this study was to improve the segregation of metal using of ultrasonic vibration in a centrifuge.

Appendix (Zevakin E.A.)

To promote and simplify the process of projecting of this device a special analytical method was used. So far as elaboration of one multifunctional device on the stage of projecting is connected with many troubles (especially if this device is very complicated) one special analytical method was used, named “analytical complex”. This is actually in studying complicated physico-chemical processes (independently from character and purpose for elaborating of one such device). Consequently a common approach is proposed for cases of projecting and producing these devises. Essence of the used method consists in using the system-approche. All processes are presented as summe of still more minor processes, who are subdivised on still more minor, etc.

Moreover, such dividing may be made on several different levels (fig. 2). This stage presents one analysis of the process.

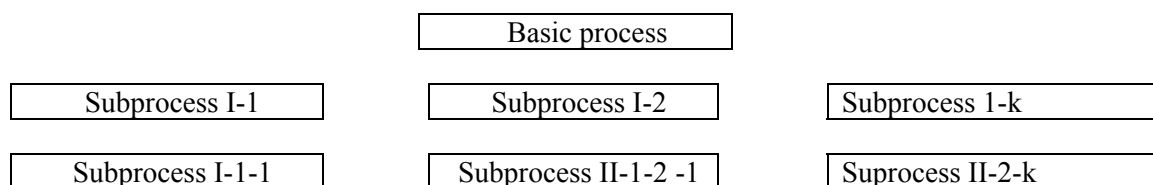


Fig.2. Scheme of the processes

For realization of any process there are two ways: analysis of this process and analysis of used system. The system is considered be effective, if of its realization we receive one optimum value of the necessary parameter:

$$K_{ef.s} = P_{opt} / N_{min},$$

where: $K_{ef.s}$ - effective coefficient of the system, P_{opt} - optimum significance of the necessary S-system parameter; N_{min} - minimum value of resource expenditue, that is necessary for S-system realization.

The next stage of this analytical way is the devise's synthesis as one united complex. The following algorithm of action is analysis of our process (e.g. the reiterated division of the process on the subprocess) offering of one S-system's variant, who is necessary for its realization; choice of the most effective version of such system; synthesis of our device (analytical complex). On the base of the choosed variant, checking, perfectioning and adoption of the complexis element, creating analytical complex, who can solve the proposed task, with maximum $K_{ef.s}$, value; finishing of all elaboration. If the realized complex may solve our task with maximum effective coefficient's value its elaboration we consider as finished. But if is not so, then the process of elaboration is subjected to reiteration (repeating of all or some stages, using another variants of systems, parameters and their combinations until we shall get the sutisfactory result).

Let us look (with taking into account the basic arguments of chosen algorithm) the process of the devices elaboration that is intended for modeling of the mtchanisms that guarante the segregation of small quatities of metallic phases in the codition of partial melting modelled silicate matter. Here is presented the principal scheme of devise in which the melt shall be affected simultaneously by centrifugal forces and ultrasonic vibration (fig. 3):

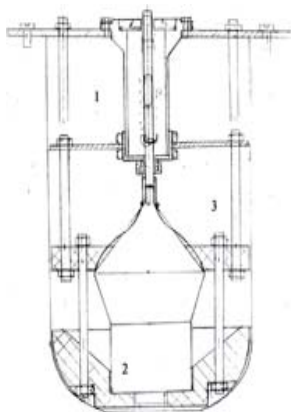


Fig.3. Principal scheme of devise
1. Rotary furnace of the centri-
fuge. 2. Transducer. 3. Holder.

In the present the mentioning analytical complex has been at stage of revision and making.

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