

DIPARTIMENTO DI INGEGNERIA INDUSTRIALE

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To whom it may concern

Letter of REFERENCE

Mulloeva N.M. presented for the degree of candidate of chemical sciences, specialty 02.00.04 - Physical chemistry a thesis with title "Physic-chemical properties of lead alloys with alkaline earth metals".

Lead and its alloys are widely used in hydrometallurgy, electroplating, and producing the battery cable technology. However, technological progress in the field of materials science lead alloys imposes new requirements in connection with their operation in harsh environments.

As it is known, the improving of the alloys is directly dependent on their component composition. The chemical composition determines certain characteristics of alloys, which are then transferred to the product.

Thus, the thesis work, according to the author's abstract includes the following topics of physical chemistry of lead alloys. She studied a wide range of temperatures and set the heat capacity of the lead alloy with alkaline earth metals. She studied the influence of the content of alkaline earth metal and temperature change in the heat capacity of the alloys. Next, using the experimental values of the calculation of the temperature dependence of the specific heat enthalpy held, entropy and Gibbs free energy for the lead with alkaline earth metal alloys have been determined. These thermodynamic properties of alloys are new and are very interesting.

Further, it is shown that the oxidation of lead alloys with alkaline earth in a liquid state are subject to the hyperbolic law. It is established that there is a general trend to increase the oxidation rate with increasing temperature and concentration of the alkaline earth metal melt. Experiments show the change of the kinetic characteristics of alloy oxidation process within the sub-group of alkaline earth metals.

The final part of the work is devoted to the study of the anodic behavior of lead alloys with alkaline earth metals in an electrolyte concentration of NaCl varying environment. It has been shown that alloying of lead with different alkaline earth metal concentrations increases its stability in the anodic half.

The studies of anode properties of the alloys are mainly carried out in NaCl electrolyte medium. She should conduct research in acidic and alkaline environments

Summing up the general characteristics of the work, it should be noted that the author of dissertation did a lot of work that can be seen from the published material, the total number of more than 50 titles. According to the research, she published a monograph and 10 papers in journals of State Commission for Academic Degrees and Titles of the Russian Federation. The results are widely presented in more than 40 different international and national conferences and are protected by three patents of the Republic of Tajikistan small.

Observation:

However, some deficiencies not affect the value of Mulloeva N.M. thesis and its author deserves the award she desired degree of Candidate of Sciences in specialty 02.00.04 - Physical chemistry.

Sincerely,

Padova 18th April 2016

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