

BOMB COMBUSTION CALORIMETER WITH ISOTHERMAL SHELL

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Abstract: A bomb calorimeter with an isothermal shell having a limit of permissible relative standard deviation of the random component of the calorimeter error of 0.05% when calibrated for benzoic acid with a weight of 0.4 g has been developed, manufactured, and tested. The volume of the calorimetric bomb is 300 cm³. The calorimeter does not require an external thermostat or cooling water. The nominal temperature of the shell temperature control can be changed depending on the magnitude of the measured heat release and the temperature of the laboratory room. This creates optimal conditions for performing a calorimetric experiment and obtaining an accurate result. The tests of the calorimeter showed that the proposed design, the method of conducting the calorimetric experiment, and the high sensitivity and stability of temperature measurements make it possible to determine the energy equivalent of the calorimeter with a relative expanded uncertainty of up to 0.015% for a heat release of about 26 kJ and 0.04% for a heat release of about 5 kJ.

Keywords: bomb calorimeter; isothermal shell; temperature measurement; energy equivalent; measurement error

DOI: 10.30826/CE23160212

EDN: OXGJBQ

Table Captions

Table 1 Calibration of the calorimeter for a heat release of 5 kJ

Table 2 Calibration of the calorimeter for a heat release of 10 kJ

Table 3 Calibration of the calorimeter for a heat release of 26 kJ

Acknowledgments

The research work was financially supported in part by the subsidy allocated by FRC CP RAS for the execution of the State Task on the topic 0082-2016-0011 "Fundamental studies of the processes of transformation of energy-containing materials and the development of scientific bases for controlling these processes" (State registration No. AAAA-A17-117040610346-5).

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Received December 26, 2022

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