Measurement of Thermophysical Properties of Reactive materials in the Temperature Range 200K -2000K. Problems and solutions.

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The fire protection effect in building insulation and other materials during fire is provided by endo latent heat effect. For example, gypsum drywall is a passive fire protection material when used as a component in fire barriers. When exposed to heat/ fire, the water contained in the material is vaporized, retarding heat transfer until the water in the gypsum is gone. Similar problems exist during reentry of space apparatus, chemical technology/sintering, in the PCM insulation materials, etc. The method of monotonous heating, MMH, is a unique model of real processes in reactive materials, and allows measuring all thermophysical properties: thermal conductivity, diffusivity, specific heat, latent heat effects. The method of measurement of thermal conductivity using MMH technique was described in the ASTM E2584-14. Recently, in a revised ASTM E2584-20 standard we suggested a test technique for measurement of thermal diffusivity, in addition to the thermal conductivity. This combination allows to calculate specific heat, and evaluate latent heat effects and provides solution of any variants of Fourier equations. The main task of this paper is to review and analyze the development and application of the standard ASTM E2584-20, including main limitations of the method.

- The main not solved problems is non-linear behavior of apparent thermal physical properties especially during reactions.
- Limitations on testing of semitransparent/scattering for heat radiation material are considered.
- Direct measurements of latent heat effects in industrial boards are suggested
- Reliability and accuracy of different variants of heater meters is analyzed. Novel variants of heat meters for application up to 2000K are suggested.