Thermokinetic Processes of Hydration of Binders Based on Scrap Concrete

R. V. Lesovik , Ahmed Anees AlAni

The object of research is the hydration of binders obtained from scrap concrete of destroyed buildings and structures. We used fractions of scrap concrete 0.00–0.16 mm and 0.16–0.315 mm, as x-ray phase analysis of various fractions of scrap concrete showed that these fractions have the highest content of non-hydrated alite and belite particles.
As a result of thermokinetic studies, it was found that the highest value of the heat release rate is observed in a binder based on scrap concrete with a specific surface of 964 m2/kg: 2.4 times higher than with a specific surface of 555 m2/kg; 1.3 times higher than with a specific surface of 1255 m2/kg; 1.6 times higher than with a specific surface of 1431 m2/kg. This fact reflects its higher reactivity. The results obtained are consistent with the physical and mechanical characteristics of binders based on scrap concrete in the initial period of hardening and are of practical interest from the point of view of controlling the structural and mechanical properties of concrete mixtures on the developed binders. Thus, with a specific surface area of 964 m2/kg, the best conditions are created for the formation of the primary framework and its further fouling with various calcium crystal hydrates, which provide optimal density and strength. This composite binder composition, with a specific surface area of 964 m2/kg, is characterized as the most energy-efficient.