

Radiation shielding of ultra-high-performance concrete with silica sand, amang and lead glass

ABSTRACT

Barite in Malaysia is limited; therefore, a locally available alternative source must be identified to meet the requirements of high-density concrete for radiation shielding. We selected steel fibre-reinforced ultra-high-performance concrete (UHPC) samples with different inert materials, namely, silica sand, amang and lead glass, as the study object and tested them experimentally for their mechanical properties and radiation absorption capabilities. The UHPC samples showed compressive strength values exceeding 155 MPa at 28 days. Meanwhile, UHPC with lead glass underwent decreased of compression strength in a long period, and UHPC with amang caused an issue related to radiological safety despite that it was effective as a γ -ray shield. Thus, the use of UHPC with silica sand is practical for constructing nuclear facilities because of the abundance and cost-effectiveness of the involved materials.

Keyword: Ultra-high-performance concrete; Amang; Lead glass; Radiation; Attenuation; γ -Rays