

### 18.13 **The use of oil shale ash in construction and building materials**

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The chemical composition of oil shale ash (OSA) can vary widely, ranging from high SiO<sub>2</sub> content, which is only pozzolanic in nature, to high CaO content which has cementitious properties on its own. Moreover, its mineral composition is similar to that of clay, so it could be used as a clay replacement in the production of some construction and building materials, such as Portland cement or porous brick. Here we introduce a set of methods for producing building materials from OSA. There are two methods of producing Portland cement. One involves replacing clay with OSA in the production of Portland clinker as an energy source for the clinkering process and as a raw material in the cement. Testing of OSA Portland cement shows that when OSA makes up 12-15 wt.% of the material, the compressive strength is greater than 55 MPa. The other approach is to use OSA as an additive for the clinker in the production of high-grade cement. The results obtained on materials prepared in this way indicate that OSA doping of 10 wt.% yield the optimum compressive strength (55 MPa) and that doping up to 30 wt.% does not significantly reduce the compressive strength. Experimental results confirm that addition of OSA can enhance the hardness and freezing properties of the material, and can reduce cement permeability. Porous brick was produced by sintering a mixture of the starting materials (gangue, OSA and green clay) using a particular weight ratio. The resulting material has a compressive strength greater than 15 MPa and a roasting liner shrinkage of 2.75. Concrete hollow blocks were produced using OSA as the primary raw material via extrusion molding and pressure curing technology. The key physical properties of concrete hollow block are as follows: compressive strength = 12 MPa, density = 930 kg m<sup>-3</sup>, water absorption = 14%, frost resistance = 9. In summary, using OSA in construction and building materials will not only reduce production cost but also provides a solution to the problem of OSA disposal.