

# Applied Physics

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## The effects of bauxite, metakaolin, and porosity on the thermal properties of prepared Iraqi clays refractory mortars

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One of the most important requirements for the manufacture of refractory mortars, especially those used in the construction of thermal systems (building or plastering), is the balance between thermal insulation properties and porosity. Where, increasing porosity of mortar to a large amount may be always undesirable, because the absorption of liquid and gases emitted from industrial system is decline the bonded with bricks and structural properties of mortars. Refractory mortars prepared from either fired bauxite or metakaolin clays with different percentages of kaolin (10, 20, 30, and 40 wt. %). Bauxite rocks were fired at 1200 °C and

metakaolin was obtained by firing kaolin up to 700 °C then crushed and grinded. Grog was added to mixture to reduce the shrinkage. Cylindrical specimens are prepared and then sintered at 1200 °C. All mixtures maintained a low thermal conductivity within the limits of thermal insulation material (less than 0.5 W/m. K); it was done by controlling the porosity which reached a maximum value approximately 25%. The volumetric heat capacity and thermal diffusivity was ranged between (1–10 MJ/m<sup>3</sup> K), (0.06–0.2 mm<sup>2</sup>/s), respectively.

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