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Influence of Nepheline Syenite on Mechanical Reliability of Ceramic Raschig Rings

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The influence of nepheline syenite on physicochemical properties of extruded ceramic Raschig ring was investigated. Industrial kaolin was used as reference composition and different amounts of kaolin were replaced with nepheline syenite ranging 5–15 wt%. The laboratory experimental results showed that the use of 5 wt% nepheline syenite in ceramic composition improves the final product characteristics. This mix also showed maximum mechanical compressive strength and reliability attributed to improve microstructural homogeneity. On comparing the chemical resistance data, it was found that the optimum condition for obtaining the maximum strength and reliability satisfactorily covers the optimum condition for chemical resistance.

Introduction

Ceramic packings are widely used in packed bed columns to contact liquid and gas phases in processes such as absorption, distillation, waste-water treatment, and other various processes in chemical and petrochemical plants. The mechanical compressive strength as well as their reliability are the most important properties that directly depend on the microstructural characteristics of ceramic body. The ceramic Raschig ring is the simplest

form of ceramic packing with hollow cylindrical shape and equal dimensions in external diameter and width.^{1,2}

Extensive shaping methods have been proposed to manufacture ceramic Raschig rings with high technical performance in chemical environments. Shaping process has attracted extensive attention as one of the most important step during the fabrication process.^{3,4} The most used green methods to fabricate these rings at industrial level are extrusion and uniaxial pressing. Also, slip casting can be considered as an alternative method for production of Raschig rings.⁴ The advantages of extrusion process include high mechanical strength and adequate strength reliability.^{4,5} The firing of ceramic Raschig ring promotes physicochemical reactions responsible for the

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