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Coking phenomenon detection in liquid flow through a solid phase in a lab-scale distillation column using Radioisotope techniques

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Abstract

Radioisotope Technology has proven its suitability as a diagnostic tool for troubleshooting Industrial distillation columns. In packed bed distillation columns, the coking phenomenon is likely to occur inside the packing (solid) through which a liquid is flowing.

The aim of the proposed work is to try to address the coking phenomenon as a challenging issue in petrochemical industry by combining or integrating sealed radioactive source techniques and radiotracer techniques. The results correspond respectively to tests using two radioisotopes with gamma scanning technique and radiotracers. In the first approach the structural characteristics of a laboratory constructed distillation column have been investigated by using the Gamma scanning technique which consists in using a ^{60}Co as a gamma ray sealed source associated to a NaI(Tl) detector. The second approach by radiotracers consists of an injection of an appropriate quantity of a specific radiotracer ($^{99\text{m}}\text{Tc}$) at the inlet of the process and studying its presence in the column.

According to the results, it was concluded that the radiotracer method may be a good approach for detecting the presence of coke in case of liquid flow through solid packing in distillation columns.

Keywords: Coking, Gamma scanning, radiotracer, cobalt60, Technetium-99m

1. Introduction

The Solution of problems encountered during production, in processing and in industrial plants based on the correct diagnosis. The diagnostic tools are multiple, radiometric

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