Chapter 3


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ABSTRACT

The abatement of emission gases, such as SOx, NOx, and COx, is one of the main problems studied by researchers for continuous developments, necessitating considerable investments by several industries. Currently, the scrubber system with its use form, and the chemical precipitation method that is considered as an alternative, are the two different processes that have demonstrated the best results for emission abatement. In this chapter, an assessment is performed on an industrial scale for both the processes, their comparative advantages are discussed, and possible applications presented.

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INTRODUCTION

Currently, in several industries, there are environmental regulations to control emission and various preventive measures have been realized according to the process structure. As solutions to the emission problem, till date, several processes have been developed. For emission abatement, the ease of use of the proposed process, and the energy and expense entailed are most important topics that require attention. Therefore, most proposed emission abatement methods in the industry currently, are mist eliminator processes that contain scrubbers. In a mist eliminator system, the emission gases in the source are sent to multiperforated layers after they condensed to known density values. Over the last 20 years, mist eliminators have been implemented for emission gas abatement in the petroleum and fertilizer industries. There are several examples of mist eliminator implementations that are used for COx, NOx, and SOx abatement. The removal of sulphur dioxide from the reaction ambience using mist eliminators is an important abatement process (Wesley et al., 2000).

Another process that has been developed for mist elimination is a frusto-conical shaped protrusion system. The emission abatement efficiency in such a layered mechanical system is cost effective and has minimum chemical wastes (Jarrier et al., 2012). A prilling system that separates gases and liquids using mist a separator (Parks, 2001) is also available. Another mechanical system developed for mist elimination is wave-plated and has been implemented in the petroleum and fertilizer production industry (Azzopardi et al., 2002). Elimination methods that utilize the precipitation of fine particles in the emission gases have been developed (Altman et al., 2001). There are several processes in which the exact values of the air pollution levels are detected but they have some problems in terms of the process feasibility, including cost problems (Boyden et al., 2006). To prevent the contamination of the emission gasses, a combined coalescing media and a centrifugal cyclone system are highly beneficial in industrial production (Birmingham et al., 2001). To abate emission waste, processes that work at different pressure and temperature conditions are available and their implementation have been successful (Austrheim et al., 2008). There are some systems that minimize NOx emission using acid spray wet scrubbers. Such a process has been used to reduce emission gas wastes such as ammonia (Hadlocon et al., 2014). In another abatement system, gases emitted to the air have been removed using a condensing heat exchanger (Bielawski, et al., 2001). Systems using venturi scrubbers and absorbers for the elimination of emission gases have been most advantageous for the industry (Hargrove et al., 2004). An example of the mist eliminator used for minimizing emission is the multilayered eliminator.
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