The comparison of ammonia removal from air by a wet scrubber packed with ceramic raschig rings and PVC

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Abstract

Background: Different packing materials are used in wet scrubbers that each one has its own advantages and limitations. Common ceramic packing materials have high removal efficiency but they are heavy, fragile and high head loss along the bed. Finding a suitable replacement for these materials has always been concerned by researchers. The objective of the present study was to compare the ammonia removal efficiency from air by a wet scrubber packed with ceramic raschig rings and PVC.

Methods: A laboratory scale column was randomly packed in 30 cm depth with ceramic raschig rings as well as PVC. Ammonia laden air was injected into the column at three air flow rates including 5, 10 and 15 lit/s. Ammonia gas was applied to the column in three concentration ranges including 23-26, 40.2-43.7 and 55-60 PPM using water scrubbing liquid.

Results: The result of 54 experiments revealed that the efficiency of column packed with raschig rings was higher than the efficiency of column packed with PVC in all three studied air flow rates. The removal efficiency of column increased significantly in both packing ($P<0.001$) as the inlet concentration of ammonia gas was increased. The head loss across the bed was significantly increased ($P<0.001$) as air flow rate was increased from 5 to 10 and 10 to 15 lit/s.

Conclusion: PVC can be considered as a suitable substitute for ceramic raschig rings in wet packed scrubbers.

Key words: Ammonia, Wet scrubber, Raschig rings, PVC

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