


Original Paper

Design and Numerical Simulation of a Gas Mixer

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Abstract

A high precision gas mixer used to mix gases of small flow rapidly and uniformly was proposed in this paper. Nine simulation schemes were proposed based on orthogonal test. There were four factors including dilute gas flow rate, the length of mixing tube, the diameter of the mixing chamber and the width of the mixing chamber in orthogonal test and each factor had three levels. The numerical simulation was carried out to explore the relationship of the flow field and the four factors and to calculate the concentration of carbon monoxide at the mixer's outlet. The primary factor that affected the mixing effectiveness was found out by means of range analysis. The heterogeneous degree of the distribution of carbon monoxide concentration at the mixer's outlet was smaller than 0.002 under different conditions. The results reached uniform micromixing in engineering and met the requirement of measurement and detection.

Keywords

Mixer – Small flow – Structural design – Numerical simulation