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## Sensitivity analysis of some key factors on turbulence models for hydrogen distribution using HYDRAGON code

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This work presents the effect of injecting air-fountain inside a containment to investigate the gas distribution analysis by using HYDRAGON code. The effect of three turbulence models, i.e., a standard  $k-\varepsilon$  model, a re-normalized group (RNG)  $k-\varepsilon$  model and a realizable  $k-\varepsilon$  model were analyzed and the simulation results were compared with the published experimental data. Three different air-injection velocities were used to analyze the stratification break-up phenomena. When the air-injection velocity was set to 0.411 m/s and 5.143 m/s, the simulation results obtained by using all the three turbulence models were in better agreement with the experimental data. However, when the air-injection velocity was set to 2.803 m/s, the simulation results obtained by SKE and RNG turbulence models have captured the experimental trends at different elevations better than RLZ turbulence model. When the turbulent diffusivity coefficient was applied to RNG and RLZ turbulence models, a small effect on simulation results was observed. Moreover, the results obtained by using SKE turbulence model with turbulent diffusivity coefficient term had no noticeable effect.

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