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Protective water curtain ammonia absorption efficiency enhancement by inorganic and surfactant additives

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Abstract: Comparative tests with and without three inorganic salts (FeCl_3 , AlCl_3 and MgCl_2) and surfactants in water curtain were carried out experimentally to investigate the ammonia decontamination in confined space. Experimental scenarios include single additives of each inorganic salt and their pair combination of compound additives. The results show that the single inorganic salt can promote the chemical decontamination effect of water curtain on ammonia decontamination and the compound additives have better synergistic effect on ammonia decontamination. The decontamination mechanism consists of physical absorption, air entrainment, physical block and chemical absorption. The best optimal ratio of compound additive solution is 5:5. The addition of surfactant additive improves the surface properties of the solution, reduces the surface tension, increases the interface area between water curtain and ammonia, efficiently promotes the physical and chemical performances of contained inorganic salt additive. Moreover, the causticity of inorganic additives were tested and the results showed that the added inorganic salts hardly have corrosive effect on facilities. X-ray diffraction was also conducted to analyze the characteristics of water curtain decontamination products. The results indicates that the decontamination products are mainly chloride and hydroxide, which lead to no secondary pollution.

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