

Application and Regeneration of CuMnCeO Catalyst Supporting K₂CO₃ Sorbent Adapted to CO Oxidation and CO₂ Absorption

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Abstract : The requirement for the long-term mission of the submarine and spacecraft has made the removal of CO₂ and trace CO the critical technology to ensure the health and life of the crews. In this work, CuMnCe, a metal oxide catalyst, supporting K₂CO₃ sorbent was prepared by the wet-solid state impregnation method to realize the integrated CO and CO₂ removal, which might also reduce the volume/mass load of the purification units in the limited space. The as-prepared samples with different addition amount of K₂CO₃ were tested using the fixed bed reactor to reveal the CO oxidation and CO₂ absorption behavior. And the regeneration and stability experiments were also conducted. The results showed that the samples realized the catalyst and sorbent integration to capture CO and CO₂ at the same time. The addition amount of the sorbent had a weak influence on the CO oxidation performance. While the addition amount affected the CO₂ sorption efficiency and capacity significantly. Meanwhile, the presence of water vapor could reduce the CO oxidation activity of the samples similarly, whether with K₂CO₃ sorbent addition or not. Furtherly, regeneration and stability experiment results showed that the samples after 3-5 times regeneration exhibited almost the same performance of CO and CO₂ removal. Summarily, CuMnCe catalyst supporting K₂CO₃ sorbent could be a good attempt to control CO and CO₂ pollutants generated from the daily equipment running and staff breathing in the confined space such as submarine and spacecraft.

Keywords : CO oxidation, CO₂ absorptio, potassium carbonate, CuMnCe metal oxide, confined space

Conference Title : ICECE 2020 : International Conference on Environmental and Chemical Engineering

Conference Location : Bali, Indonesia

Conference Dates : January 13-14, 2020