

Iron-based nanoparticles oxygen scavenger for suppressing heat-stable salts formation in amine

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ABSTRACT

Heat-stable salts (HSS), which trigger excessive foaming in absorber, are formed when protonated methyl diethanolamine (MDEA) reacts with the more acidic degraded products in the presence of dissolved oxygen (DO). The aim is to suppress the HSS formation in MDEA solution inaugurally employing a hybrid iron-based nanoparticles (HINP) oxygen scavenger. It was discovered that the oxygen-scavenging performance of a more cost-effective 20 %Fe/HZSM5 was one-fold higher than the 20 %Fe/MCM-41. The former was verified for its superior structural properties. The Fe²⁺ on its surface first reacted with DO, preventing DO from oxidizing the MDEA. Consequently, the absence of hydroxyl radicals eliminated the potential of formic acid formation, hence suppressing the MDEA-acid HSS formation.

KEYWORDS

Amine; Heat-stable salts; Iron-based nanoparticles; Nanoparticles; Oxygen scavenger

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