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Impact of diesel emission fluid soaking on the performance of Cu-zeolite catalysts for diesel NH_3 -SCR systems

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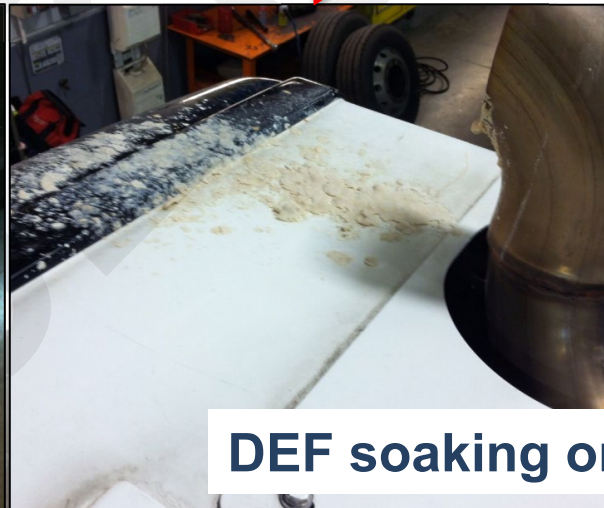
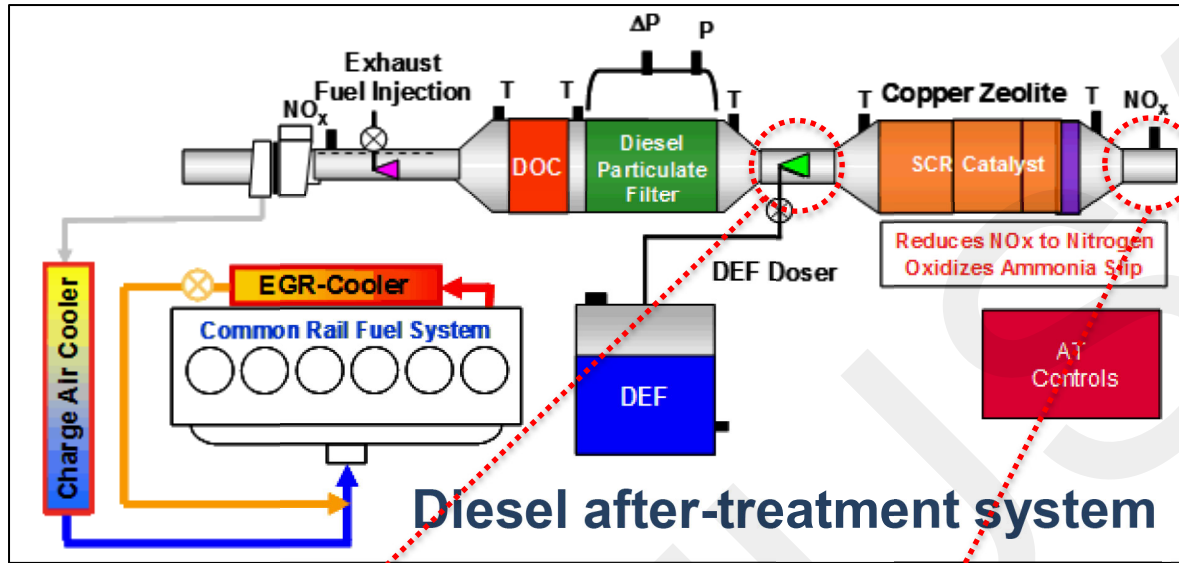


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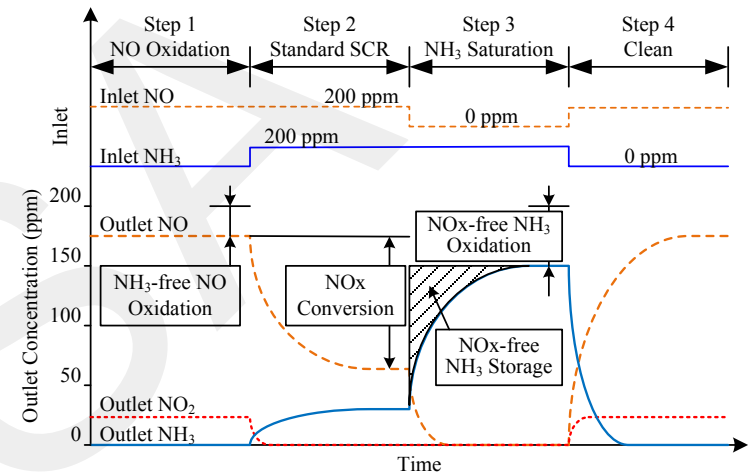
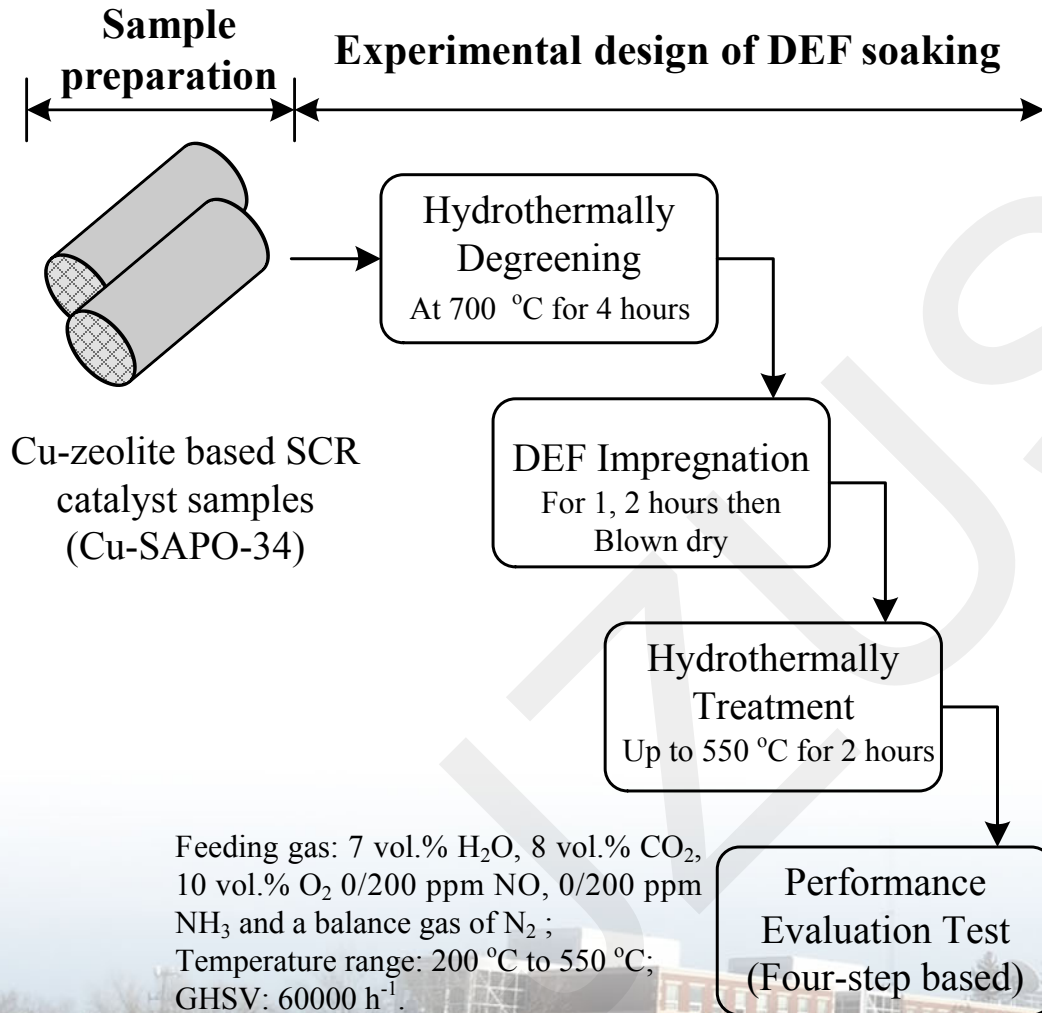


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DEF soaking and urea deposit issues in real application



Experimental method



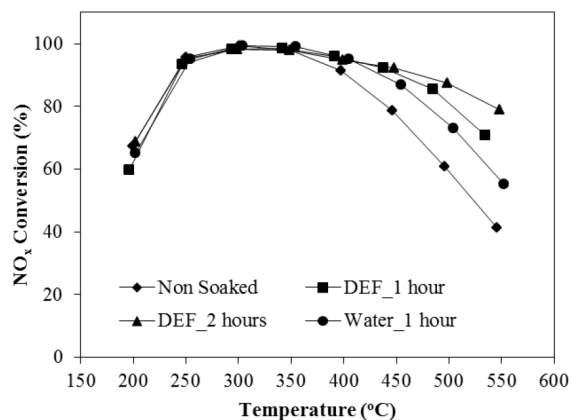
Four-step based SCR catalyst performance test

SCR catalyst samples

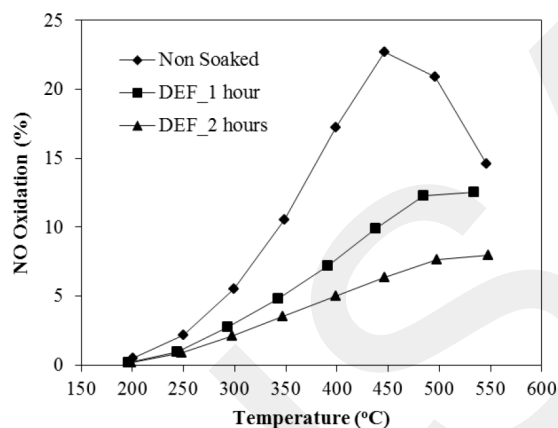
Catalyst Material	Cu-zeolite (Cu-SAPO-34)
Core Diameter (cm)	2.54
Core Length (cm)	5.08
Cell Density (CPSI)	400

Entire experimental procedure

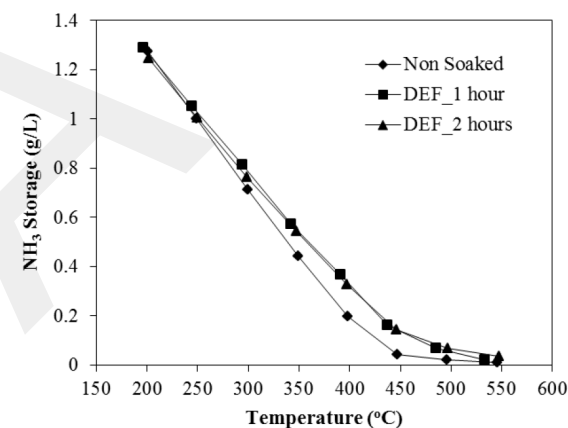
Results and discussion



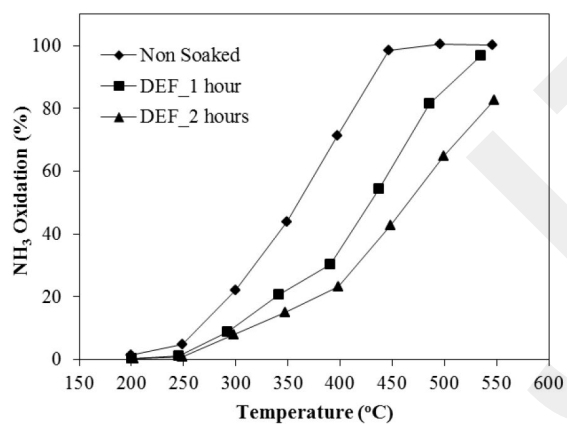
NO_x conversions of SCR catalyst samples



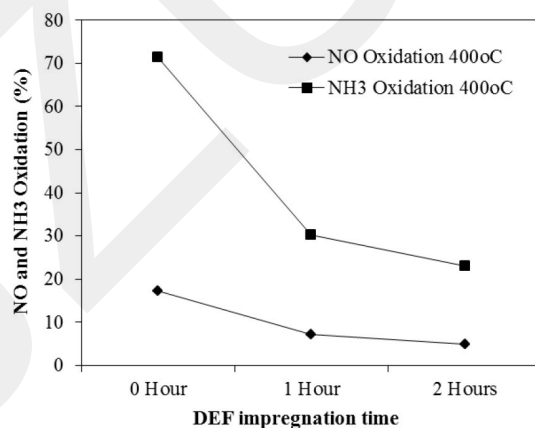
NH₃-free NO oxidations of SCR catalyst samples



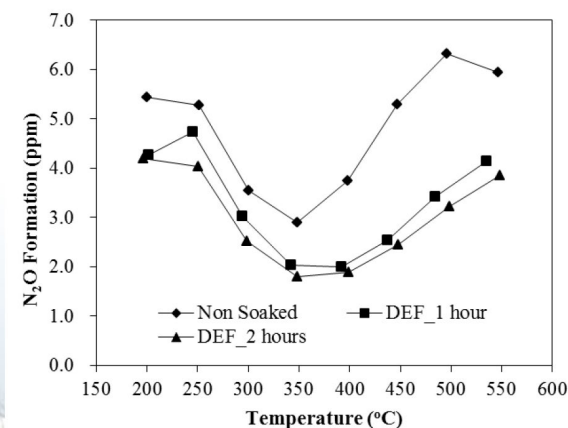
NO_x-free NH₃ storage level of SCR catalyst samples



NO_x-free NH₃ oxidations of SCR catalyst samples



NO and NH₃ oxidations of SCR catalyst samples with different DEF impregnation time



N₂O selectivity of SCR catalyst samples

Conclusions

- ❑ DEF soaking leached some Cu from the SCR catalysts and slightly reduced their Cu loadings.
- ❑ The loss of Cu and associated metal sites on the catalysts weakened their catalytic oxidation abilities and caused lower NO/NH₃ oxidation and lower high-temperature N₂O selectivity.
- ❑ Lower Cu loading also made the catalysts less active to the decomposition of surface ammonium nitrates and decreased low-temperature N₂O selectivity.
- ❑ Cu loss during DEF impregnation released more acid sites on the surface of the catalysts and increased their acidities, and more NH₃ was able to be adsorbed and involved in SCR reactions at medium and high temperatures.
- ❑ Due to lower NH₃ oxidation and higher NH₃ storage, the DEF-impregnated SCR catalyst samples showed higher NO_x conversion above 400 °C compared with the non-soaked one.
- ❑ The negative impact of urea deposits during DEF impregnation was not clearly observed, because the high-temperature hydrothermal treatment helped to remove the urea deposits.