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## Regeneration of a spent hydroprocessing catalyst by *in situ* non-oxidative treatment methods

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Investigation on the life cycle of hydrotreating catalysts in pilot plant unit are focused on the end of run and fouling problems. One of the non-conventional ways of regenerating the spent catalyst is using *in situ* non-oxidative regeneration of spent hydroprocessing catalyst from Kuwaiti refinery was studied. The non-oxidative regeneration treatments, including: Washing the spent catalyst with a straight run gas oil (SRGO) at 150 and 200° C respectively, accelerated solvent extraction technique and regeneration at temperature 450° C under 50 bar using H<sub>2</sub> diluted with 0.4% of H<sub>2</sub>S. The spent catalyst and regenerated catalysts were characterized by elemental analysis, solid-state <sup>13</sup>C nuclear magnetic resonance (NMR) analysis and Fourier transform infra-red (FTIR) techniques. The regenerated catalysts were evaluated with a feedstock containing 30 vol% of coker gas oil and 70 vol% of straight run gas oil in a microreactor system. Three types of catalysts are loaded for comparison of their activity test: Fresh catalyst and oxidative and non-oxidative regenerated catalysts. The results indicate that *in situ* non-oxidative regeneration is able to regenerate the spent hydroprocessing catalysts under similar operation conditions of the refinery. This treatment overcomes the disadvantages of the oxidative regeneration method.

### Biography

Narjes Abul has 17 years of experience in petroleum refining hydroprocessing operations in pilot plant scale from Kuwait Institute for Scientific Research. She has worked in characterization of petroleum fractions using gas chromatography, catalysts evaluation and characterization also on gas chromatographic techniques and other analytical techniques such as TGA and elemental analysis. Her research is specialized in coke and wax deposition especially in regeneration of used catalysts. She has also worked on projects related to asphaltene nitrogen and sulfur separation from heavy oils.

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