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OXIDATIVE DESULPHURIZATION OF DIESEL FUEL

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The effectiveness of a newly developed process for deep desulphurization was tested using conventional No. 2 diesel fuel. This process combines oxidation with solvent extraction. Oxidation converts weakly polar aromatic sulphur to polar sulphoxides and sulphones. Subsequent solvent extraction removes these polar compounds, thus producing clean diesel fuel. An oxidation catalyst used was of TiO₂, V₂O₅, and Pt wash-coated on cordierite. Catalytic oxidation was carried out in a single step under atmospheric pressure, mild temperature and using ozone as the oxidizer. The feed No. 2 diesel fuel contained 360 ppm sulphur but it was reduced to as low as 32 ppm upon methanol extraction of the oxidized oil. Detailed analytical revealed that sulphur compounds boiling in 290°C-350°C were selectively removed by the present method. It was determined that the most critical operating parameter for obtaining a low sulphur product was the ratio of fresh ozone feed rate to fresh oil feed rate. The formation of tarry precipitates depends of the severity of oxidation conditions; It reached 12 wt% of the feed when sulphur was reduced from 360 ppm to 32 ppm. GC-MS of the tarry precipitates revealed that they were mostly aromatics and sulphur compounds were concentrated in this fraction.