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聚乙二醇对非负载型Ni-Mo催化剂结构及加氢脱硫性能的影响

Effect of PEG on the Structure and Hydrodesulfurization Performance of Unsupported Ni-Mo Catalyst

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关键词:
非负载型加氢催化剂； 聚乙二醇； 二苯并噻吩； 加氢脱硫； 超低硫柴油； Unsupported Hydrotreating Catalyst； PEG； Dibenzothiophene； Hydrodesulfurization； Ultra Low Sulfur Diesel

摘要:
非负载型加氢催化剂由于金属含量高，因而具有较高的加氢活性。然而目前采用水热法合成获得的金属活性相之间容易产生聚集而降低其分散度，从而影响其活性的发挥。本文采用非离子型的水溶性聚合物聚乙二醇(PEG)作为助剂来增加非负载型催化剂的分散性，考察了聚乙二醇对催化剂晶形结构、孔结构和表面形貌等性质的影响，并以二苯并噻吩(DBT)和催化裂化(FCC)柴油为原料对催化剂活性进行了评价。结果表明，加入聚乙二醇后，其非负载型催化剂晶粒间形成许多囊泡结构，金属分散度大有提高；同时催化剂颗粒表面疏松多孔，增加了可暴露活性位数量。活性评价结果表明，PEG的加入可明显提高非负载型Ni-Mo催化剂的加氢脱硫活性。

The unsupported hydrotreating catlyst has high hydrogenation activity owing to its high metal content. While the metal active phase over the unsupported catalyst is easy to gather, and then reduces its dispersion during the proc-ess of hydrothermal synthesis, which affects the activity of the catalyst. The non-ionic water-soluble polymer polyeth-ylene glycol (PEG) was adopted as additives to increase the dispersion of the unsupported catalyst, and the effect of PEG on the crystal structure, pore structure and surface morphology of the catalyst was examined. The activities of the catalysts were evaluated by hydrotreating dibenzothiophene (DBT) and fluid catalytic cracking (FCC) diesel. The analysis results from SEM and HRTEM showed that after adding PEG, many vesicles were formed between the catalyst grains which greatly improved the metal dispersion. At the same time, the catalyst particles surface was more porous which increased the number of the active sites exposed to reactant. The activity evaluation results revealed that the ad-dition of PEG could obviously improve the HDS activity of the unsupported Ni-Mo catalyst.

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