

The effect of crystal structure of ZT sorbent on the regeneration property

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The regeneration properties of Zinc-Titanium sorbents(ZT) calcined at different temperatures were measured fixed bed reactor at middle temperature(Sulfidation;480°C, regeneration;580°C). The sorbents treated at higher temperature than 1000°C showed a spinel crystal structure by XRD, while those treated lower than 700°C showed a separated ZnO and TiO₂ with rutile crystal structure. They showed also different regeneration properties. The ZnS produced from the spinel structure during sulfidation was easily regenerated even at 580°C, while that from the separated ZnO and TiO₂(rutile) needed a temperature higher than 610°C for regeneration. This difference was not changed by repeated cyclic absorption-regeneration experiment, and the initial crystal structures of both sorbents were restored. These results were explained by the difference in reactivities of ZnS with different crystal structures. In addition, anatase form of TiO₂ with octahedral structure, of which structure was same with the TiO₂ presented in Zn₂TiO₄ of spinel structure. While only rutile structure of TiO₂ was formed from the separated ZnO and TiO₂(rutile) sorbent. To study these differences further, FT-IR, FT-Raman, TPD and TPR were used and their results were discussed.