

REMOVAL OF CH₃SH OVER MODIFIED PAN-ACF OF HIGH SPECIFIC AREA BY HEAT-TREATMENT

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Introduction

CH₃SH is a typical ill-smelling compound, the connected odorous pollution gas is hard to treat because the objective compound is of PPM or PPB order of magnitude, so researchers turned their eyes to AC, and have made some progresses[1]. In present study, we modified PAN-ACF of high surface area by heat-treatment, and test its deodorant properties in presence of water and oxygen.

Experimental

The PAN-ACF of high surface area (abbreviated as K2ACF) (2278m²/g) is heated at 950°C for 1.5hrs, cooled to room temperature in inert atmosphere, then contact the air at room temperature for 0.5hr, and the final sample is named as K2HT.

Dynamic adsorption test is conducted in fixed bed. The model inlet gas mixtures were N₂+ CH₃SH (300mg/m³) +H₂O(5v%)+ O₂(6.5 v%). The weight of samples packed, inlet CH₃SH concentration, inlet total flow rate were 200mg, 300mg/m³ and 270ml/min, respectively. The inlet and outlet H₂S were analyzed by GC-FPD.

TG analysis was conducted by Sinku-Riko TGD-5000.

Results

The adsorption capacity of CH₃SH over K1ACF is much less than that over common PAN-ACF of smaller specific area surface (ACF) (e.g. 600~800m²/g). While, after heat-treatment, the dynamic adsorption capacity over K2HT is enhanced to a relative large extent in presence of H₂O and O₂, compared with K1ACF (see fig.1). And the same

modification doesn't occur for common PAN-ACF.

Moreover, the modification of adsorption ability of K2HT only occurs in the above condition noted. Without H₂O in inlet gas mixture, the adsorption capacity is comparable to that of K2ACF(fig.2).

Discussion

The adsorption of CH₃SH over PAN-ACF contains catalysis conversion process. Moreover, catalysis process is more important than the pure adsorption.

In the course of catalysis process, pre-adsorbed H₂O and inlet H₂O make important role simultaneously.

Without inlet H₂O, the adsorption and conversion capacity of K2HT is comparable to K2ACF, indicating inlet H₂O is one of needed factors determining the adsorption and conversion process.

Compared K2HT with K2ACF, the important difference lies in the H₂O pre-sorption amount, and the former is of much larger pre-sorption amount than K2ACF before adsorption (see fig.). In presence of H₂O, K2ACF is of little adsorption capacity of H₂S, indicating inlet H₂O isn't only factor enhancing the adsorption capacity, and possibly does the pre-sorbing H₂O make great role in the conversion of H₂S.

Conclusion

After heat-treatment, K2HT is of much higher adsorption capacity of CH₃SH than K1ACF in presence of H₂O and O₂. As for this process, the

adsorbed water and inlet water makes important roles, simultaneously.

1. Ikeda H, Asaba H and Takeuchi. Removal of H₂S, CH₃SH and (CH₃)₃N from air by use of chemically treated activated carbon. J Chem.Eng.Jpn 1988;21(1):91-97

Reference

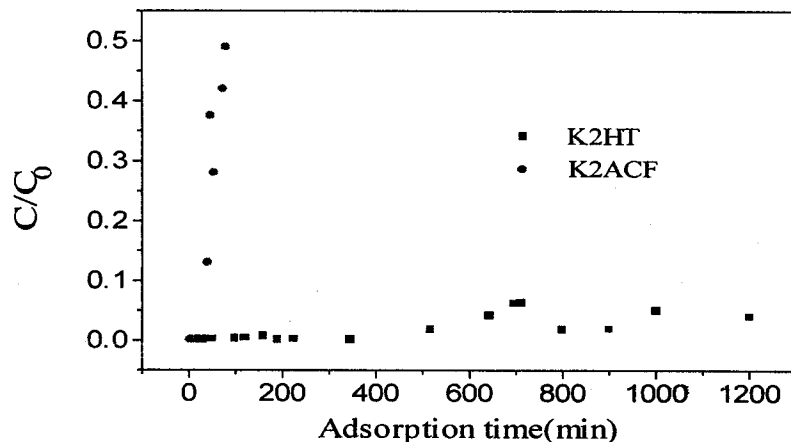


Fig.1 Breakthrough curve of CH₃SH over Modified and unmodified HSACF in presence of H₂O

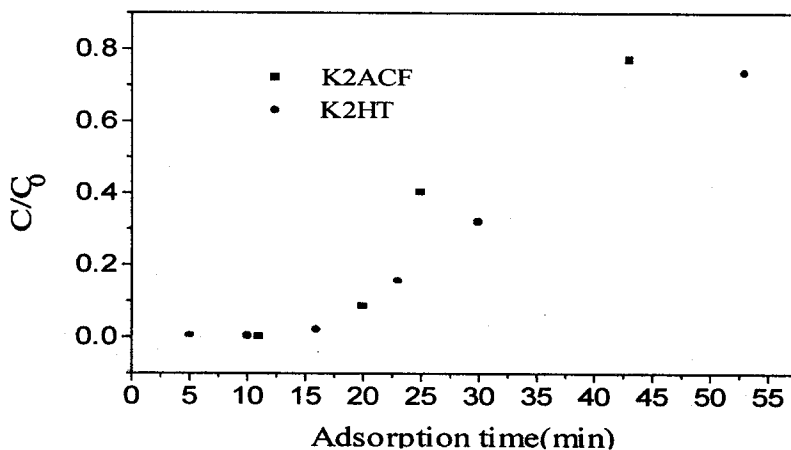


Fig.2 Breakthrough curve of CH₃SH over Modified and unmodified HSACF in absence of H₂O

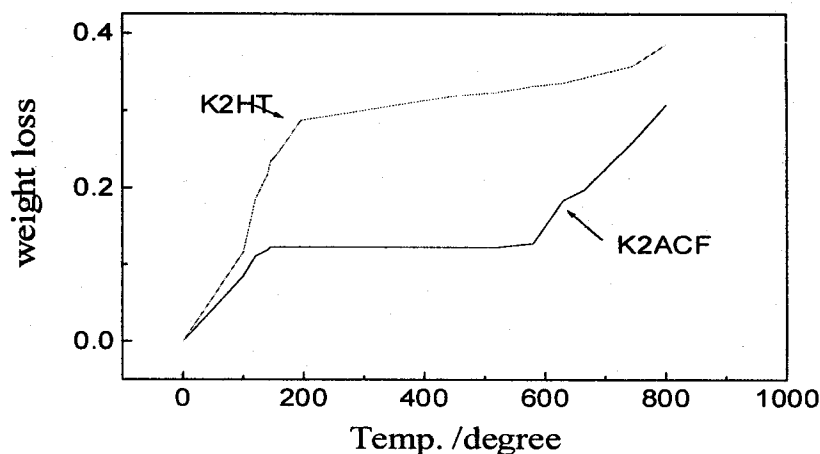


Fig.3 TG plot of K2ACF and K2HT