REMOVAL OF CH_3SH OVER MODIFIED PAN-ACF OF HIGH SPECIFIC AREA BY HEAT-TREATMENT

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Introduction

CH_3SH 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) (2278m^2/g) is heated at 950℃ 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 N_2+ CH_3SH (300mg/m^3) +H_2O(5v%)+ O_2(6.5 v%) . The weight of samples packed, inlet CH3SH concentration, inlet total flow rate were 200mg, 300mg/m^3 and 270ml/min, respectively. The inlet and outlet H_2S were analyzed by GC-FPD.

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

Results

The adsorption capacity of CH_3SH over K1ACF is much less than that over common PAN-ACF of smaller specific area surface (ACF) (e.g. 600~800m^2/g). While, after heat-treatment, the dynamic adsorption capacity over K2HT is enhanced to a relative large extent in presence of H_2O and O_2, 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 H_2O in inlet gas mixture, the adsorption capacity is comparable to that of K2ACF(fig.2).

Discussion

The adsorption of CH_3SH 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 H_2O and inlet H_2O make important role simultaneously.

Without inlet H_2O, the adsorption and conversion capacity of K2HT is comparable to K2ACF, indicating inlet H_2O is one of needed factors determining the adsorption and conversion process.

Compared K2HT with K2ACF, the important difference lies in the H_2O pre-sorption amount, and the former is of much larger pre-sorption amount than K2ACF before adsorption (see fig.). In presence of H_2O, K2ACF is of little adsorption capacity of H_2S, indicating inlet H_2O isn't only factor enhancing the adsorption capacity, and possibly does the pre-sorbing H_2O make great role in the conversion of H2S.

Conclusion

After heat-treatment, K2HT is of much higher adsorption capacity of CH_3SH than K1ACF in presence of H_2O and O_2. As for this process, the

adsorbed water and inlet water makes important roles, simultaneously.

Reference

1.Ikeda H, Asaba H and Takeuchi. Removal of H_2S, CH_3SH and $(CH_3)_3N$ from air by use of chemically treated activated carbon. J Chem.Eng.Jpn 1988;21(1):91-97

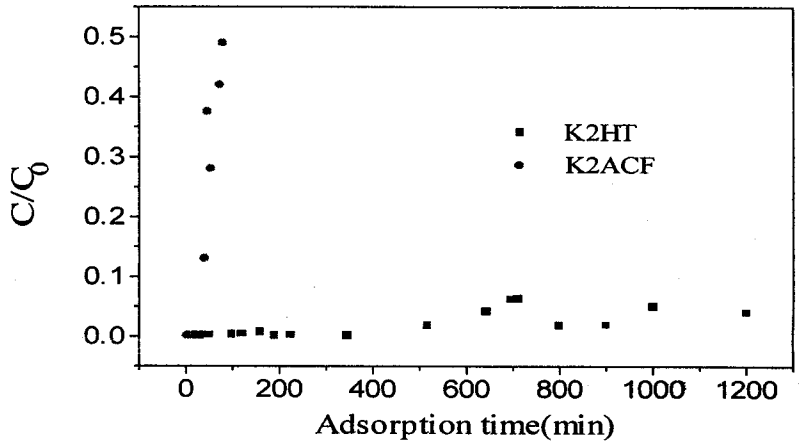

Fig.1 Breakthrough curve of CH_3SH over Modified and unmodified HSACF in presence of H_2O

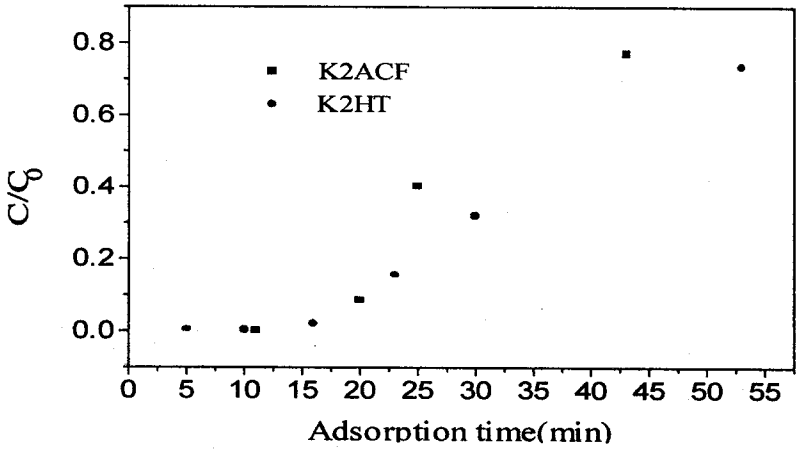

Fig.2 Breakthrough curve of CH_3SH over Modified and unmodified HSACF in absence of H_2O

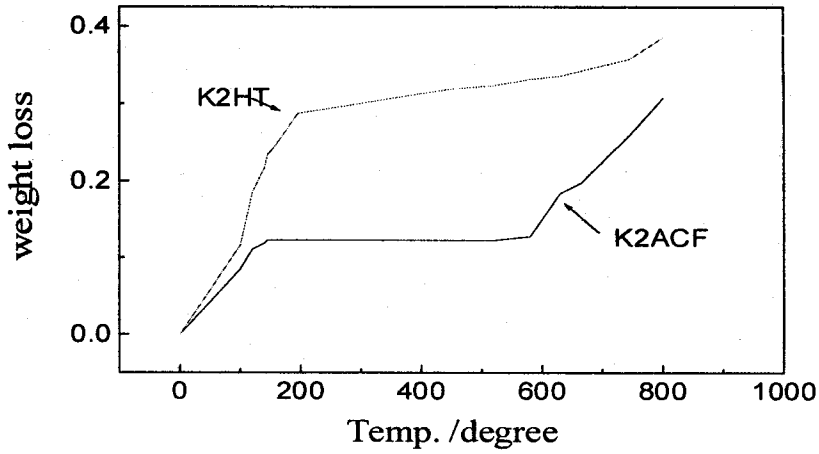

Fig.3 TG plot of K2ACF and K2HT