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DVS Application Note 14

Moisture Sorption of Activated Carbon

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This application note describes the measurement of moisture sorption on BPL activated carbon using DVS.

Introduction

Activated carbons are widely used throughout industry in a variety of applications from environmental air filtration to solvent and heavy metal recovery. The sorption of moisture by activated carbons is pertinent to many of these applications and has traditionally been measured volumetrically or by vacuum gravimetric systems.

Method

The moisture sorption/desorption isotherm for BPL activated carbon was measured on a DVS system using a sample size of approximately 40mg and a dm/dt equilibrium value of 0.002% per min. The sample was dried in flowing nitrogen prior to measuring the isotherm in order to estimate the reversible moisture content.

Results

Figure 1 shows the kinetics of sorption/desorption for the drying stage and the first few isotherm steps. The sample contained approximately 1.7% of reversibly adsorbed moisture, and establishment of equilibrium at each stage over this part of the isotherm is rapid. The full sorption/desorption isotherm, shown in Figure 2, shows a sharp rise above 40% RH characteristic of moisture sorption on activated carbon and agrees well with literature data [1]. The isotherm also displays a large hysteresis loop reflecting the highly porous nature and surface activity of the adsorbent.

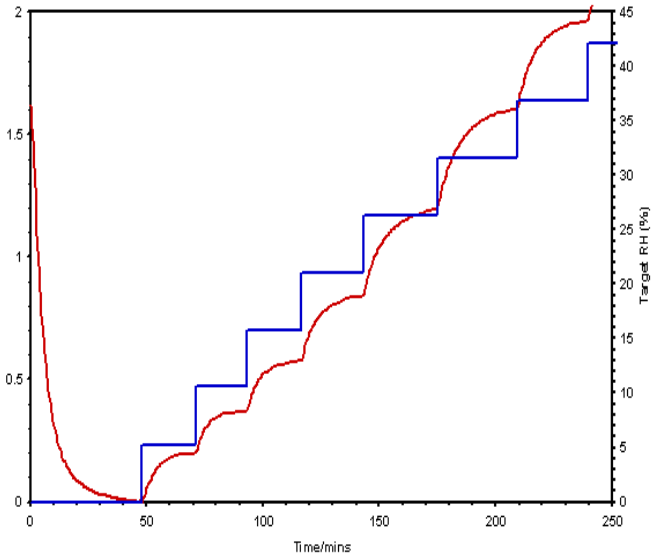

Figure 1. The kinetics of moisture sorption for BPL activated carbon at 25°C.





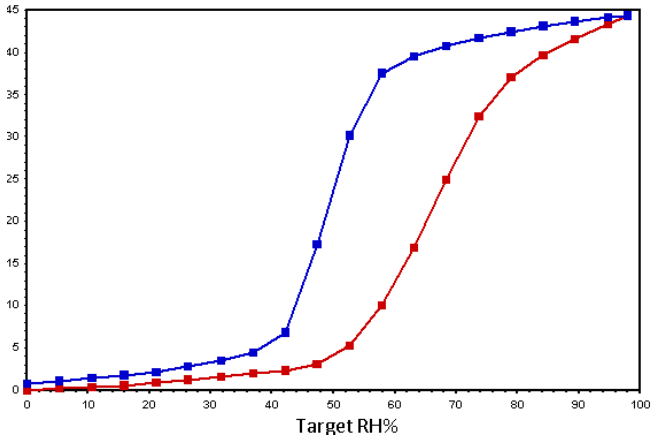

Figure 2. Moisture sorption/desorption isotherms for BPL activated carbon at 25°C.

Conclusion

The moisture sorption/desorption isotherm for BPL activated carbon was measured on a DVS system and showed a large hysteresis loop reflecting the porous nature of the material.

Acknowledgement:

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References

[1] R.C. Bansal, J. Donnet, F. Stoeckli, *Active Carbon*, Marcel Dekker, 1988

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