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3<sup>rd</sup> International Conference and Expo on

## OIL AND GAS

July 13-14, 2017 Berlin, Germany

## Adsorption dynamics and rate assessment of volatile organic compounds in active carbon

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Voltile organic compounds (VOCs) emanated from car spills and oil and gas development can have mutagenic and carcinogenic effects on human beings. Adsorption using activated carbon with high specific surface area and large pore volume was one of the most widely used and mature methods to recycle VOCs. In this paper, an investigation was presented about terahertz time-domain spectroscopy (THz-TDS) as a novel tool for the characterization of the dynamic adsorption rate of volatile organic compounds, including isooctane, ethanol, and butyl acetate, in the pores of active carbon. The THz-TDS peak intensity (EP) was extracted and corresponded to the measurement time frames. By analyzing EP with time, the entire process could be divided into three physical parts including volatilization, adsorption and stabilization so that the adsorption dynamics could be clearly identified. In addition, based on the pseudo-second-order kinetic model and the relationship between EP and time in the adsorption process, a mathematical model was built in terms of the adsorbed rate parameter and the THz parameter. Consequently, the adsorption rate of isooctane, ethanol and butyl acetate could be assessed by the THz measurement, indicating that THz spectroscopy could be used as a promising selection tool to monitor the adsorption dynamics and evaluate adsorption efficiency in the recovery of pollutants.



Figure 1: Adsorption Isotherm of Different Volatile Liquids

## Biography

Jing Zhu has received her BSc degree from China University of Petroleum, China in 2011. She is currently working toward her PhD degree in Material Science and Engineering at China University of Petroleum, Beijing, China. Her research interests focus on the application of THz waves.

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