Methane storage in porous activated carbons

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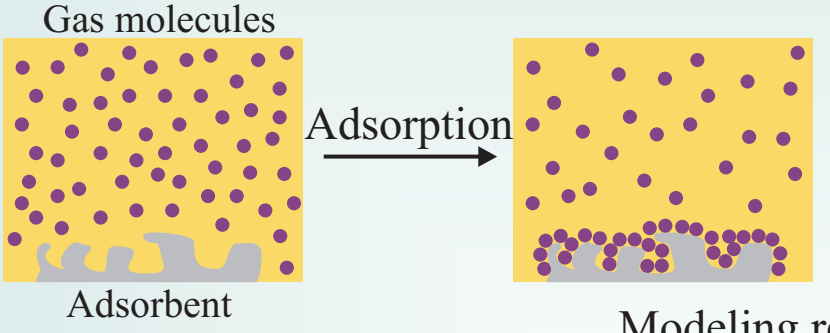
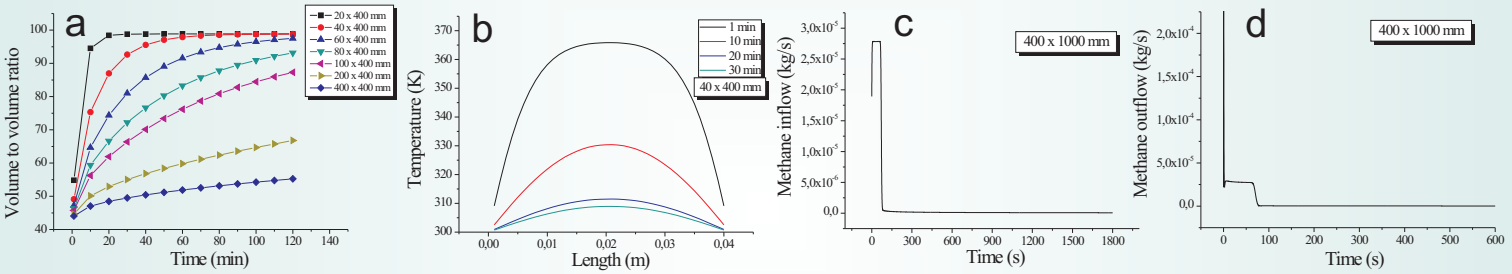
Locally produced methane, - either as biomethane or power-to-gas product, has to be stored to provide a reliable gas source for the fluctuating demand of any local gas distribution network. Additionally, methane is a prominent transportation fuel but its suitability for vehicular application depends on the ability to store an adequate amount in the onboard fuel tank. Adsorption in porous materials could enable a simple, safe and cost-effective method for storing methane at ambient temperature and at reasonably low pressure [1].



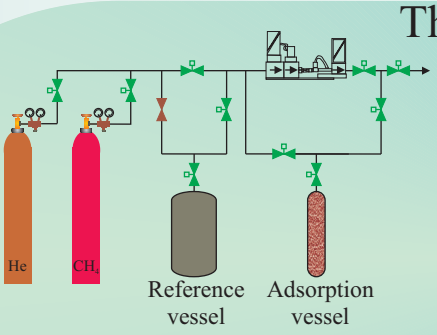
In a solid adsorbent, nanometer wide pores can trap methane by van der Waals forces as high density fluid at low pressure and room temperature [2].

Modeling results



The plot of the (a) volume to volume ratio, (b) temperature distribution, (c) adsorption inflow rate and (d) desorption outflow rate as a function of time.

The experimental setup



Activated carbons with large surface area and high porosity are particularly suitable for methane storage applications at moderate pressures [3,4].

Outlook

In this project we study and test the main thermodynamic and kinetic characteristics of methane adsorption and desorption on activated carbon. Both calculations and measurements are performed to enhance our knowledge about the general performance and the cyclic behavior of the adsorption and desorption processes.

References

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[3] Loh, W. S. et al. *J. Chem. Eng. Data* **2010**, 55, 28402847.
[4] Bagheri, N.; Abedi, *J. Chemi. Eng. Res. Des.* **2011**, 89, 20382043.

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