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Addition/Correction

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Corrections to "Filling Characteristics for an Activated Carbon Based Adsorbed Natural Gas Storage System"

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CHANGES TO THE BODY OF THE PAPER

In the original communication, simulations were carried out using a two-dimensional (2D) model instead of the stated 2D axisymmetric model to study the adsorption characteristics, with inlet gas flow rates adjusted to match the experimental data. The corrected figures for simulations with the 2D-axisymmetric model corresponding to the inlet flow rates used reported in the original communication (Figures 6−15) are given below. With the corrected symmetry, a heat of adsorption of ΔH = 12 kJ/mol (instead of ΔH = 16 kJ/mol in the original manuscript) was found to yield a good match with the experimental data. An initial pressure of 0.2 bar and initial temperatures of 301, 302, and 303 K for 1, 10, and 30 L min^{-1}, respectively, which correspond the experimental conditions are used here. Initial linear transients, in the inlet flow rates for 3, 1, and 0.5 min for 1, 10, and 30 L min^{-1}, respectively, are included in the simulations. The simulations in this erratum are performed with the following energy balance:

$$C_{\text{eff}}\frac{\partial T}{\partial t} + \rho_g C_{pg} u_g \cdot \nabla T = \nabla \cdot (\lambda_{\text{eff}} \nabla T) + \frac{\rho_b \Delta H}{M_g}\frac{\partial q}{\partial t} + \epsilon_t \frac{\partial p}{\partial t}$$

where the heat source due to compression is now included for completion. For the adsorption results, this term was found to have a small non-negligible contribution. All computations are performed using COMSOL Multiphysics 4.2a, with the Darcy model for the packed bed. The corrections to the original manuscript are given below. The filling time for the uncontrolled flow conditions (Table 3 of the original manuscript) is on the order of few seconds with the corrected geometry.

Table 3. Adsorption Data at Controlled Flow Rates, *Q*, Predicted by Model[a]

Q (L min^{-1})	t_f(min)	ΔT_{max} (K)	V_f/V_b (V/V)	η_s (%)
1.0	118.3	26.8	70.1	87.0
10.0	10.6	56.61	60.61	75.2
30.0	3.53	56.8	59.05	73.3

[a]See text for definitions of various quantities.

Additionally, in Figure 5 of the original manuscript, the pressure distributions are presented for 2.48 min (Figure 5a), 5.93 min (Figure 5b), and 10.23 min (Figure 5c).

CHANGES TO THE APPENDIX

In the original manuscript, the mass balance was computed without considering the contribution from the residual volume at the initial bed pressure. The mass balance for an initial bed pressure of 0.2 bar and temperature of 303 K at 30 L min^{-1} is

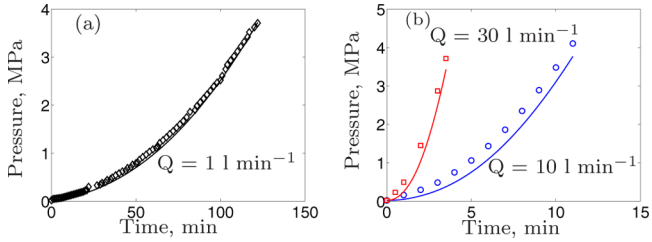

Figure 6.

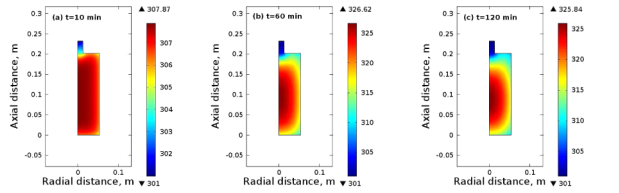

Figure 7.

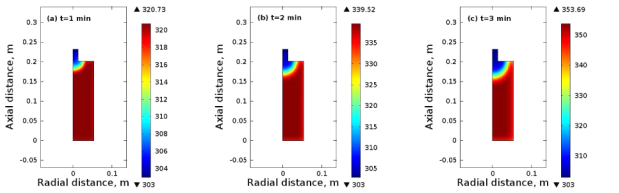

Figure 8.

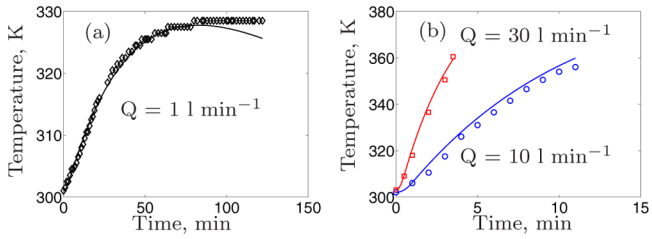

Figure 9.

given below. Bed properties and notation are similar to that used in the original manuscript. Corresponding to $\bar{P}_1$ = 0.2 bar, $\bar{T}_1$ = 303 K and $\bar{P}_2$ = 35 bar, $\bar{T}_2$ = 351.95 K.

$$\bar{\rho}_g = \frac{M_g}{R}\left(\frac{\bar{P}_2}{\bar{T}_2} - \frac{\bar{P}_1}{\bar{T}_1}\right) = 19.05\ \text{kg m}^{-3}$$

The corresponding mass of methane in the gaseous phase, m_g = 0.0225 kg and V_g = 31.51 L (STP). For the adsorbed phase, $\bar{q}$ =

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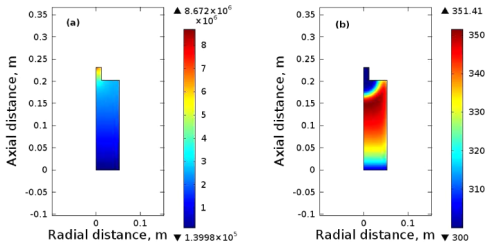

Figure 10.

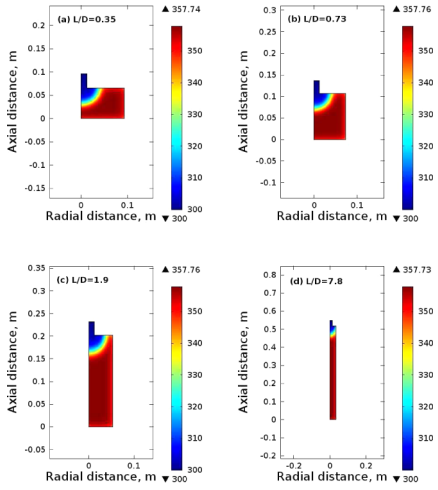

Figure 11.

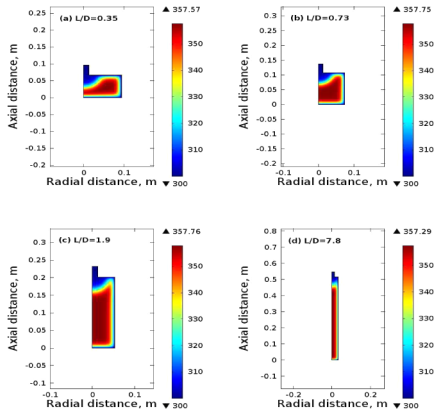

Figure 12.

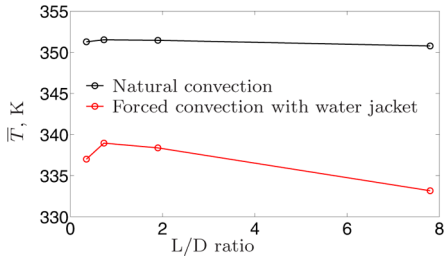

Figure 13.

0.053, m_{ads} = 0.04823 kg, and V_{ads} = 67.44 L (STP). The residual volume (V_{res}) at 0.2 bar is 5.83 L (STP). The volume of methane in the bed ($V_g + V_{ads}$) is 98.95 L (STP). The volume of gas delivered up to 3.53 min at 30 L min^{-1} with an initial linear transient of 0.5 min is 98.5 L (STP).

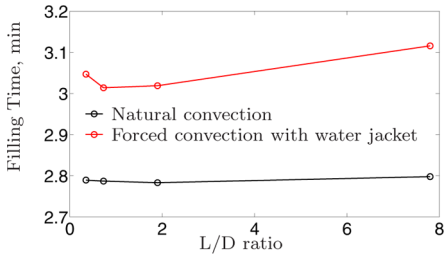

Figure 14.

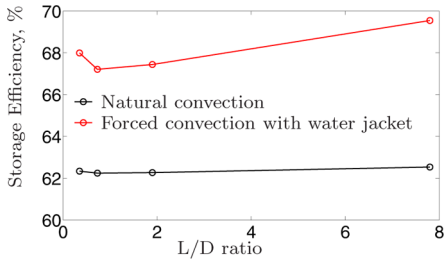

Figure 15.

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