

Review on the paper “Entropy” 3478169

**‘ADSORPTION KINETICS MODEL OF HYDROGEN ON
GRAPHITE’**

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I have mixed feelings regarding this paper

Equation (6) $k_a(p/p_0) = k_d\theta / (1 - \theta)$ represents equilibrium adsorption by Langmuir

However, Equation (17) for the non-steady-state case $c_{sat} (d\theta/dt) = k_a(p/p_0) - k_d\theta / (1 - \theta)$ is wrong.

It is easy to understand.

Imagine, there occurred the reversible first-order reaction $A \rightleftharpoons B$. Its equilibrium constant is

$K_{eq} = (B_{eq} / A_{eq})$ However, the model for the non-steady-state case

$dC_B/dt = k_f - k_b (C_B / C_A)$

is not valid.

So, if Eqn (17) is not correct. Eqns (18) – (23) obtained based on Eqn (17), are not correct as well.

In comparison, Equation (26)

$c_{sat} (d\theta/dt) = k_a(p/p_0) (1 - \theta) - k_d\theta$.

is correct.

In fact, I don't know how to resolve this contradiction.

Authors conclude the paper as follows

“Adsorption and desorption kinetics of H₂ on graphite are studied based on the non-

Langmuir adsorption and desorption equilibrium rates obtained in a previous article [1]. New analytical expressions are derived to model the kinetics both under isothermal and

non-isothermal conditions. The results show good agreement with the data given by

Burress et al. [2].”

So, the theoretical results and the experimental data are taken from papers [1] and [2], respectively. I have a question, where is an original result considering the contradiction between the models used.

My recommendation is: “major revision”. I ask author to clarify the posed problem and results.