

# Column adsorption of copper ions on modified porous glass

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Today, one of the major problems is the pollution of the environment. The main sources are industrial waste, where are found large amounts of metal ions that have a negative impact on the fauna and flora. Along with the economic development, increases the amount of pollutants emitted, resulting in an increase in the need to eliminate them.

The goal of this work is to analyse the process of adsorption of copper ions (II) on a modified porous glass Poraver® with designed adsorbing bed.



Figure 1. Porous glass - Poraver®

In order to determine the adsorption process and the time of saturation of the bed, the simulation have been made, intended to provide a time after which the bed is saturated in 5%, 50%, 95%.

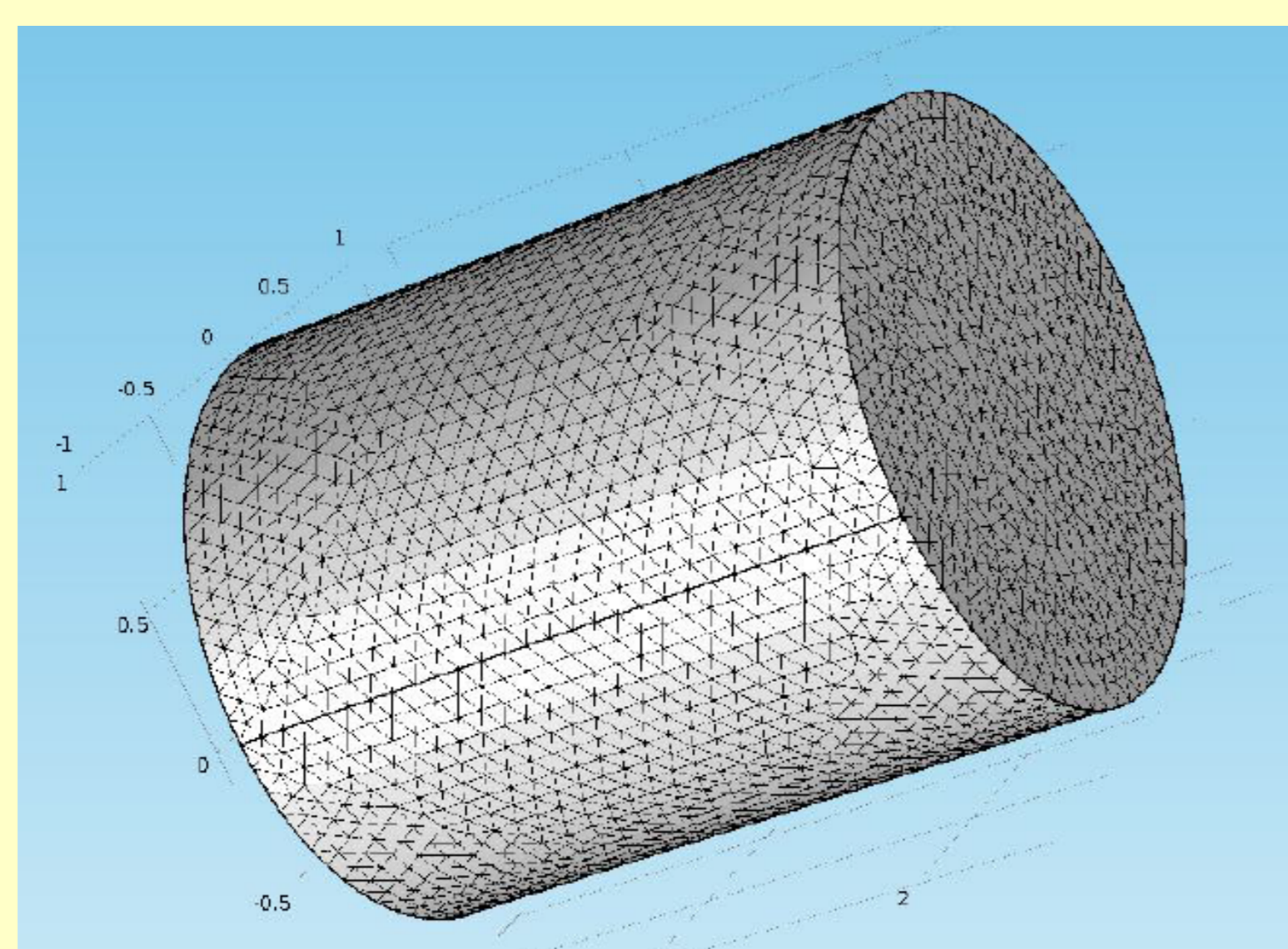


Figure 2. A model of porous bed

- Used material: Silica Glass with density  $370 \text{ kg/m}^3$  and porosity 0,51
- Mass of used bed: 3000 kg
- Used model: Species transport in porous media.
- Initial concentration of copper:  $4,67 \text{ mol/m}^3$

The simulation confirmed the adsorption properties of PORAVER®, and released the actual concentration distributions in the porous bed volumes. The simulation lasts for 10 hours.

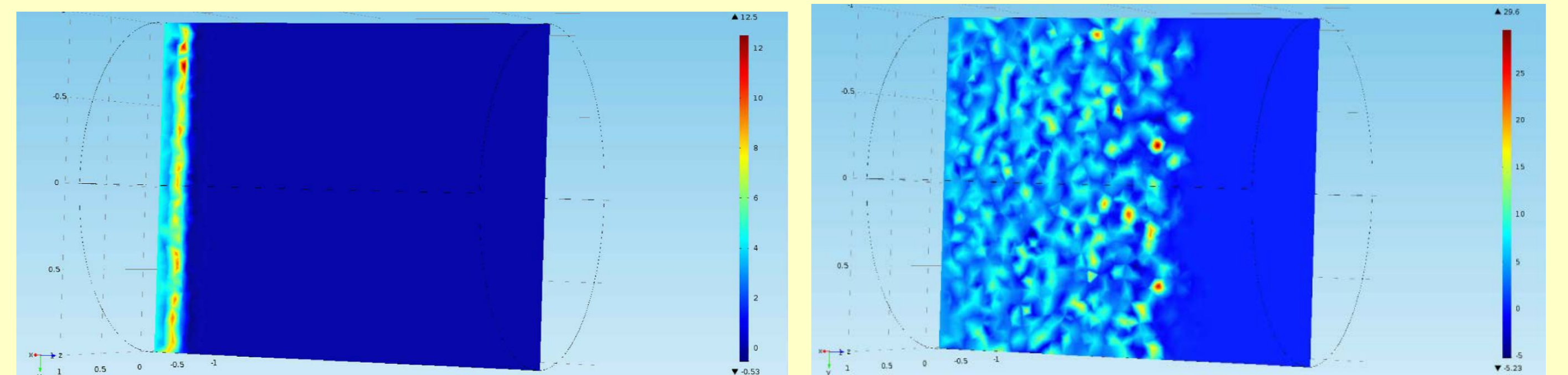


Figure 3. The axial section of porous bed  
a) Time: 2000s  
b) Time: 16000s

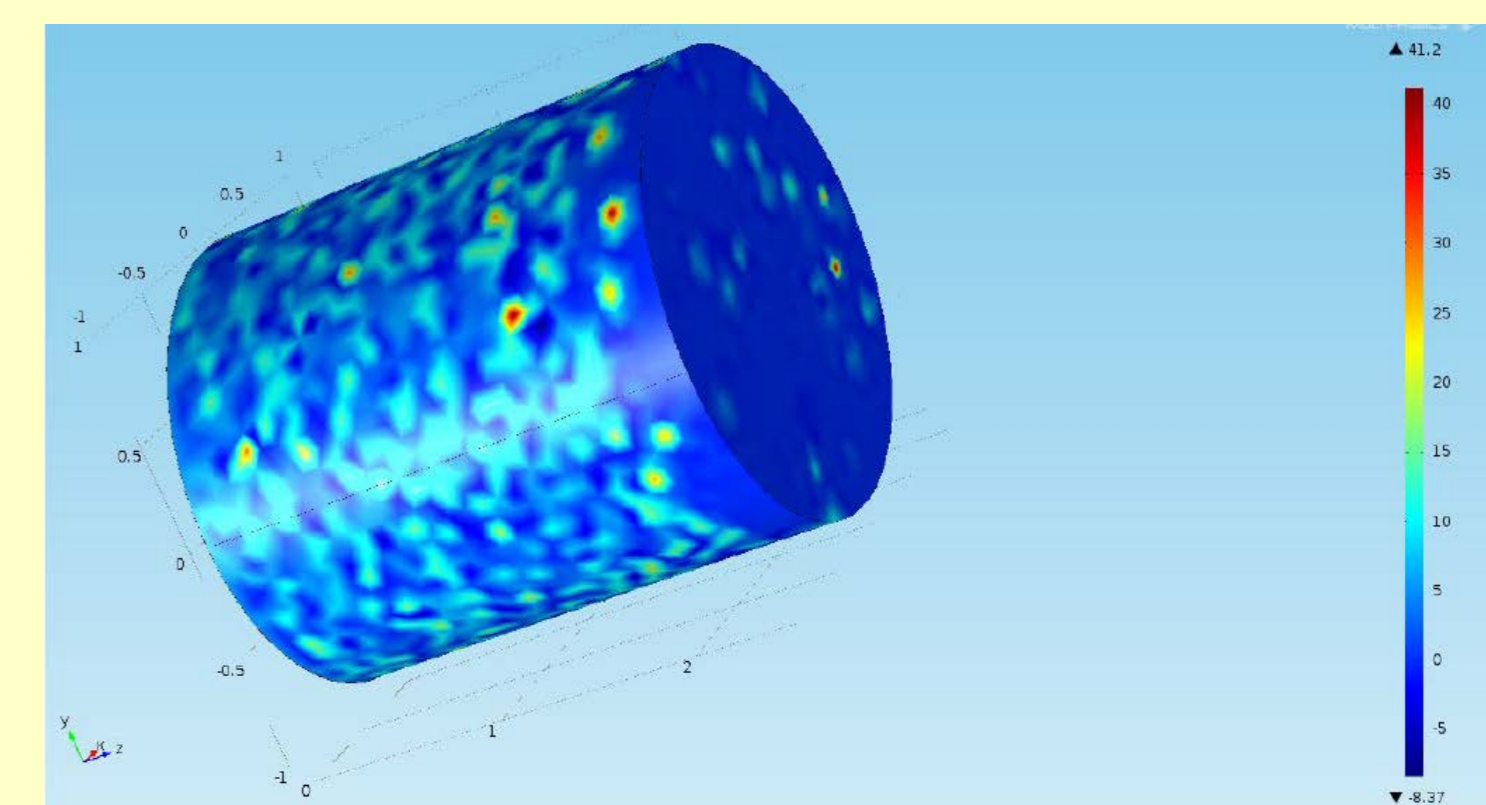


Figure 4. The example of saturated bed. Time: 23600s

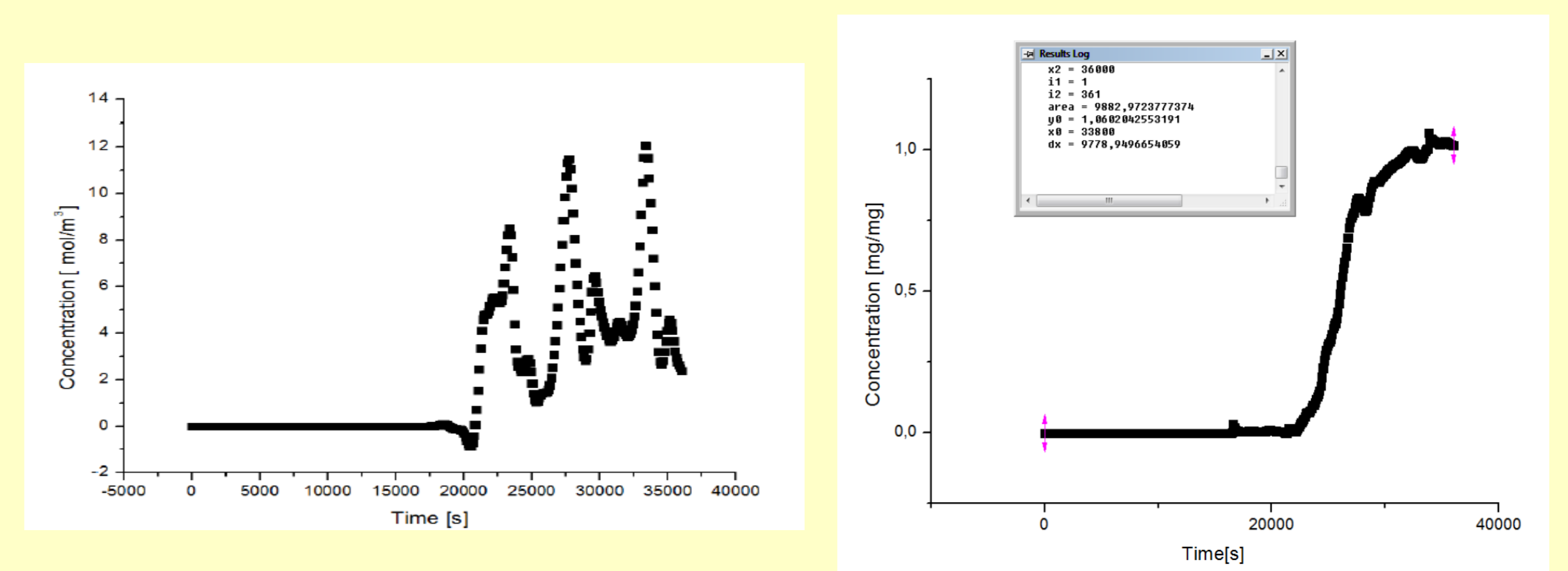


Figure 5. Concentration of copper ions  
a) position of sample: (0,0,2 x,y,z)  
b) The concentration graph of copper ions at the outflow

A characteristic feature is that we do not observe move of the mass transfer zone, only clusters of points with a higher concentration than the surroundings.

Fluctuations of concentration are caused by a continuous adsorption and desorption of copper, which is the balance between adsorption and desorption.

## References:

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