



Contribution ID: 506

Type: **Poster Presentation**

Salt precipitation and its impact on rock porosity – An X-ray micro-tomography study

Thursday, 2 June 2022 15:15 (1h 10m)

Saline water evaporation from porous media may result in salt precipitation within the pore system influencing transport properties of porous media (Dashtian et al., 2018). Porosity is one of the key characteristics which could be modified due to salt precipitation. Understanding the nature and extent of porosity reduction as a result of salt crystallization is crucial in understanding transport processes in porous media.

This work studies salt precipitation within four rock samples with significantly different pore systems and compositions. We present the precipitated salt distribution along these samples directly measured using 3D X-ray micro-tomography (micro-CT) imaging technique. The selected samples are Boise sandstone, Silurian Dolomite, Mount Gambier limestone, and Berea sandstone. All samples were initially saturated with Potassium Iodide solution (5 molar concentration) and left to evaporate over the course of 31.5 hours. The evaporation process and salt precipitation are monitored using 3D images obtained with X-ray micro-CT at timestamps of 3 and 31.5 hours after the initial saturation. Images were then segmented to determine the porosity of each sample along the core length. Although a time resolved X-ray micro-CT study (such as Pak et al 2019) may be needed to better understand dynamics of the process, the recorded pore-scale images enabled us to quantify the variation of porosity in natural porous media as a result of drying-induced salt precipitation with a high spatial resolution. Our results reveal the significant impacts of heterogeneity on the spatial distribution of precipitated salt. Additionally, we will discuss the potential consequences of our findings on water evaporation from heterogeneous porous media (Shokri-Kuehni et al. 2017).

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MDPI Energies Student Poster Award

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Country

United Kingdom

References

- Dashtian, H., Shokri, N., Sahimi, M. (2018). Pore-network model of evaporation-induced salt precipitation in porous media: the effect of correlations and heterogeneity. *Adv. Water Resour.*, 112, 59-71. <https://doi.org/10.1016/j.advwatres.2017.12.004>
- Shokri-Kuehni, S.M.S., Norouzirad, M., Webb, C., Shokri, N. (2017). Impact of type of salt and ambient conditions on saline water evaporation from porous media. *Adv. Water Resour.*, 105, 154-161. <https://doi.org/10.1016/j.advwatres.2017.05.004>
- Pak, T., Archilha, N., Mantovani, I. et al. An X-ray computed micro-tomography dataset for oil removal from carbonate porous media. *Sci Data* 6, 190004 (2019). <https://doi.org/10.1038/sdata.2019.4>

Time Block Preference

Time Block B (14:00-17:00 CET)

Participation

Online

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Track Classification: (MS02) Porous Media for a Green World: Water & Agriculture