Contribution ID: **110** Type: **Oral Presentation**

Studying viral aggregation in porous media

Monday, 31 May 2021 15:10 (15 minutes)

Viruses are generally found as aggregates in the environment. The aggregation is a natural process which helps viruses to survive in soil and sediments and provides them resistance to disinfection, when they are suspended in water. Aggregation distinguishes between homogeneous and heterogeneous. In the former viruses agglomerate among themselves; whereas in the latter they nucleate around a foreign particle. The formation of viral aggregates may facilitate transport of viruses as well as cause clogging of porous media. Viral agglomeration dependents on the type of virus, solution composition, and the presence of particulate. If there are several works where the process is investigated experimentally, there are few attempts to describe it mathematically.

Here, we present a study which combines laboratory experiments and modeling to describe the formation and the evolution of viral aggregates. In particular, bacteriophage MS2 were used and tested under the effects of porous medium geometry, pH, ionic strength, and temperature. A microfluidic system was built with channels of various geometry and sinusoidal pore-throat. A mathematical model of particle aggregation based on the population balance equation (PBE) of the number of viral particles coupled with extended DLVO theory was developed to determine the interactions among viruses and the evolution of the cluster size. Preliminary results show that, an early aggregation occurs which controls the later evolution of the cluster size. Given a type of virus, pH and pore-throat shape are the important factors controlling the aggregation process.

Time Block Preference

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

References

Acceptance of Terms and Conditions

Click here to agree

Newsletter

Student Poster Award

Primary authors: Mr ZHANG, Dong (Stevens Institute of Technology); PRIGIOBBE, Valentina (Stevens Institute of Technology)

Presenter: Mr ZHANG, Dong (Stevens Institute of Technology)

Session Classification: MS5

Track Classification: (MS5) Biochemical processes and biofilms in porous media