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Interaction of graphene oxide nanoparticles with quartz sand in presence of montmorillonite colloids

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Graphene oxide (GO) nanomaterials are used extensively in a wide range of commercial applications. Therefore, their production is growing rapidly, and it is expected that GO nanoparticles eventually could reach sensitive environmental systems, including subsurface formations, where montmorillonite, one of the most common minerals, is in abundance. This study examines the interaction of GO nanoparticles with quartz sand and montmorillonite (STx-1b) colloids at three different pH values (pH = 4, 7, and 10), and three different ionic strengths (IS = 2, 6, and 20 mM) at 25°C, under static and dynamic conditions. The experimental data suggested that neither pH nor IS played a significant role in the attachment of STx-1b colloids onto quartz sand, except for pH=7 and 10 with IS =2 mM, under dynamic conditions. Also, neither pH nor IS influenced GO attachment onto quartz sand except for pH=7, IS=2 mM, under dynamic conditions. Finally, it was shown that pH did not play a significant role in the attachment of GO nanoparticles onto STx-1b colloids. In contrast, the attachment of GO nanoparticles onto STx-1b colloids was shown to increase with increasing IS.