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*Adsorption breakthrough models for contaminant removal: a critical review*

In the process of adsorbing contaminants using a packed column the breakthrough curve describes the outlet concentration against time for a given contaminant. There exist a variety of analytical models designed to predict the breakthrough data from a sorption column, such as those of Bohart-Adams, Thomas, among others. They are expressed in terms of the operating conditions. The unknowns are then determined through comparison with data. However, there is no single model which provides the best agreement over all of the experimental data sets reported in the literature. Thus, the first goal of this talk is to go through a literature review on diverse adsorption applications in order to extract conclusions on how adsorbate, adsorbent, pH, the type of sorption and the shape of the breakthrough curve are interrelated. The second goal is to assess how different authors prove the presence of chemical reaction in the adsorption from a critical point of view. Finally, new approaches to include chemical sorption into typical advection-diffusion models will be proposed, inviting to open a discussion on the topic.