

# What is the new frontier of Hofmeister phenomena? Specific buffer effects found for lysozyme adsorption onto SBA-15 mesoporous silica

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Hofmeister (ion specific) effects are those phenomena related to the chemical nature of electrolytes. [1,2] Traditionally, Hofmeister phenomena were considered to occur at high concentrations, say in the range 0.5-2 M. In fact, several experiments showed that ion specificity occurs at physiological salt concentrations (0.1-0.15 M) and even below.[3–6] These findings have thus raised a new question. Can pH buffers give Hofmeister effects? According to the Henderson-Hasselbalch equation,[7] they should not. In biochemistry, it is usual to use a buffer to set the pH of the experiment. This procedure is also followed in many 'Hofmeister related' studies. Typical buffer concentrations are in the range 10-100 mM. The implicit assumption is that, due to their low concentration, the buffer ions do not display any specific effect. Our aim is to demonstrate that, besides strong electrolytes, also weak electrolytes used to fix pH play a specific role. To this purpose, here we studied the specific effect of buffers and salts on the physical adsorption of lysozyme onto SBA-15 and amino functionalized SBA-15 (SBA-NH<sub>2</sub>) mesoporous silica. It emerges that buffers, besides to fix pH, interact specifically with surfaces to modulate their effective charge and thus the measured loading. This specific effect is not considered by the Henderson-Hasselbalch model for buffer action.[7] The results shown here have strong implications for biointerfaces as those occurring in biochemistry and nanobiotechnology.

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