Critical role of the structure of the mineral-water interface in the zeta potential measured by streaming potential method

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In this study, zeta potential has been measured by using the streaming potential method for the intact sandstone in contact with CaCl\textsubscript{2} electrolytes. The experimental results show that a positive zeta potential has been observed for the first time for the intact Fontainebleau sandstone under high salinity of CaCl\textsubscript{2}, and its magnitude increases with increasing ionic strength. It cannot be explained by the Gouy-Chapman theory anticipating a constant potential for high salinities due to the collapse of the electrical double layer. Meanwhile, the brine effluents after the completion of the streaming potential measurements were collected and then pH and brine composition were analysed suggesting that those variations of pH and chemical composition are negligible and cannot explain the polarity change at high salinity. The anomalous positive potential of the intact Fontainebleau sandstone is due to that overcharge of calcium ions sorbed into the mineral surface, which is consistence with previous literature data.