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Enabling produced water (PW) reinjection in chalk

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The oil & gas industry is currently challenged to reduce the environmental footprint of their operations and ensure a sustainable approach in the way they deliver energy. An important aspect that requires great attention is the handling of the waste streams stemming from the production of hydrocarbons. The largest (waste) stream is the produced water (PW), which contains different chemicals used during the reservoir development and early oil & gas processing stages. For offshore applications, reinjecting the PW within the reservoir would (i) avoid the disposal of this stream into the sea and (ii) relax the strict requirements for treatment. Nonetheless, the loss of PW injectivity during reinjection may obscure its benefits and application. Injection of acid represents a practical and commonly adopted industrial solution for restoring the injectivity. Yet, acid jobs carry the additional inconvenience of the transport, handling, and storage of large amounts of acid offshore. As an alternative, we propose to acidify the injection water continuously using acid produced on the platform. To determine the minimum acid concentration required for sustaining acceptable injection rates, we follow a dual strategy involving experimental and modelling work. We first assess and quantify the near wellbore formation damage and the efficiency of the low acid injection through coreflooding and microfluidic tests. The experimental evidence is then used to develop and calibrate a fully mechanistic model that will assist in designing the chemical solution and optimizing the reinjection strategy such that injectivity impairment can be avoided.

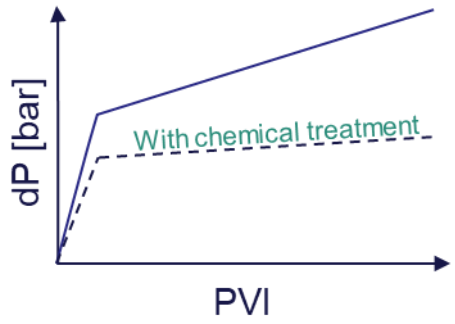

Figure 1. Pressure profile upon PWRI with and without chemical treatment