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Anti-corrosion cement for sour gas (H_2S-CO_2) storage and production of HTHP deep wells

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Abstract

A wellbore cement sheath exposed to an H_2S-CO_2 rich environment for long time will lose its general purpose (zone isolation, segregation, pipe strength improvement, etc.) due to corrosion, especially under high-temperature and high-pressure (HTHP) formation conditions. H_2S-CO_2 attacks cement by causing leaching, expansion, and dissolution effects. Therefore, this research work intends to investigate the corrosion-resistant properties of corrosion-resistant additive (CRA) for Fe_2O_3-amended cement. The experimental results indicate that the well cement with CRA has lower original permeability and calcium hydroxide (CH) content than cement without CRA; even after corrosion, it has higher compressive strength, lower permeability and smaller corrosion depth than that of cement without CRA. CRA can react with CH and high-Ca/Si hydration products to generate low-Ca/Si hydration products such as xonotlite and tobermorite. CRA cement has superior corrosion resistance because of reduced its original permeability due to film formation and filling effects and through the reduction of CH to achieve low-Ca/Si

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