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Characteristics and functional mechanisms of clay-cement stabilized three-phase nitrogen foam for heavy oil reservoir

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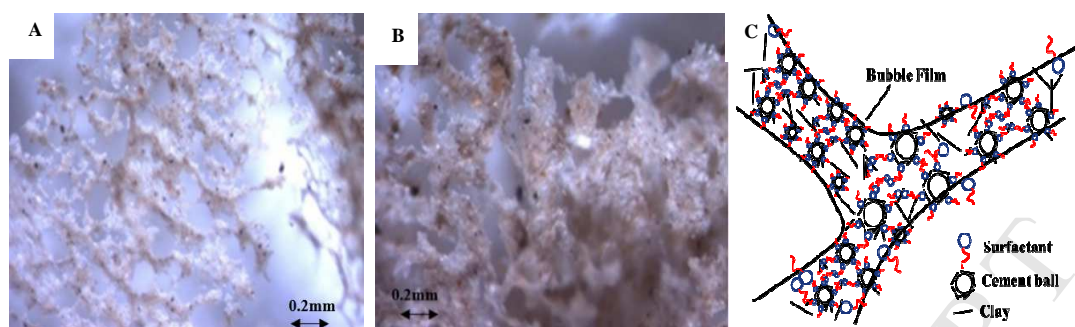


Fig. 15. Skeleton structure of three-phase foams: (A) Steric protective sheath around clay nitrogen foam. (B) Steric protective sheath around CCNF. (C) Particle distribution on bubble films.

Three mechanisms are meant to explain the high stability of CCNF-1, including the formation of particle sheath on bubble surfaces, the formation of a steric network constituted by particles through the intertwining of surfactant molecules adsorbed on clay/cement particles and the supportive effects of free surfactant molecules and redundant clay particles on steric network connection, reparation and refinish. The synergistic effects effectively protected foam bubbles from shrinking and coalescing (Nehdi, 2013).

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