

Wetting surfaces and water saturation in petroleum reservoir rocks

Given a solid surface and two immiscible liquid phases, typically one of the two liquids will be present on the solid (will "wet" the solid). The other liquid phase will instead be present only away from the solid and thus in the centers of pores. In most situations in the Earth Sciences, one of the liquids is an aqueous solution ("water"), and the other is a non-aqueous-phase liquid

(a "NAPL", which is pronounced as "napple"). A NAPL may be denser than water (a DNAPL, or "dee-napple") or less dense ("lighter") than water (an LNAPL, or "ell-napple"). Natural petroleum ("oil") is a natural NAPL, typically an LNAPL, and various anthropogenic organic compounds or petroleum distillates are common non-natural NAPLs.

The sketches below explore the geometric relationships of wetting and non-wetting fluids, largely thinking of oil (petroleum) as the NAPL in the context of petroleum geology and engineering. In that context, water saturation (the proportion of pore space filled by water) is critical, because at greater water saturation the NAPL/petroleum is immobile and thus not exploitable.

