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Impact and fate of fracturing fluid and the potential hazards to the environment

Khedidja Allia, Abderraouf Kamel, and Zineb Salem
Research Laboratory of Science in Industrial Process Engineering (LSGPI) USTHB Algeria

Oil and gas shales have become important components of energy production, particularly shale gas, which rose from almost nothing in early century to nearly 30% of natural gas production[1]. As a result, world natural gas production is expected to increase from 342 Bcf /d in 2015 to 554 Bcf /d in 2040, mainly due to a sharp increase in gas production from 42 Bcf / d in 2015 to 168 Bcf / d by 2040. With technological advances in progress, development of shale resources could be facilitated in many countries such as Algeria and Mexico, supplementing the production of the first four producing countries (Argentina, Canada, China, and USA) which already commercialize gas shale. By 2040, production should account not less than 70% of the total shale offer [2].
Although the emergence of gas and oil shale has changed the landscape of energy supply and security opportunities, difficulties have arisen, such as evaluating the actual amount of world reserves of shale hydrocarbons and its peak which could be already exceeded and for how long this could last[3]. In addition, the fear of possible severe environmental impacts has led some countries to not engage despite their large shale resources, because these impacts are often associated with hydraulic fracturing or "fracking" itself and for which evidence is increasingly denounced in places where the intense hydraulic fracturing and lack of regulation coexist.
Indeed, the growing concern is how hydraulic fracturing affects public health, as it involves handling large volumes of fluid containing a variety of physical and chemical constituents, each for a specific purpose, which are injected under high pressure through wells in subsoil to release hydrocarbons from shale formations [4]; ground and surface water pollution, degradation of local air quality, greenhouse gas (GHG) emissions, induced seismicity, etc. For these reasons, hydraulic fracturing is subject to international scrutiny with some countries defending it and the other preferring to focus on regulation than outright banning [5].
Many articles addressed diverse consequences of fracturing, however, there is less information on impacts of fracturing' fluids on public health, through the resources contaminated by their different constituents. The purpose of this article is to review their fundamental data and identify their possible impacts.