

Noble Gases as a Tracer of Subsurface Processes at CMC Research Institutes Field Research Station

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Abstract

Leakage of gases (CO_2 and CH_4) along boreholes in the subsurface contributes to greenhouse gas emissions from the oil and gas sector. Additionally, there are concerns over migration of gases in the subsurface associated with CO_2 storage and hydraulic fracturing. The objective of this research is to test the use of noble gases as tracers of gas migration in the subsurface. Noble gases have been demonstrated as useful tracers in studying the origin of gas in the subsurface. An improved understanding of gas migration in the subsurface will allow for implementation of strategies to remedy this problem. Noble gases are conservative tracers that do not participate in chemical or biochemical reactions. Their concentrations in water are determined by their solubility during recharge and by the production of some isotopes in the subsurface. Additionally their concentrations may be modified by physical processes, such as exsolution from liquids, etc. Previous research has demonstrated the utility of these gases to identify mechanisms of fugitive gas contamination in drinking water wells overlying the Marcellus and Barnett shales. This research will test these methods at CMC Research Institutes Field Research Station near Brooks, Alberta. Research results to date will be presented.