Determining the Potential Toxicity of Fracking Surfactants: An Assessment of Product Viability to Reduce Environmental Water Contamination

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Fracking is the process of extraction through injection of liquids containing chemicals at high pressures to force open pre-existing fissures. Surfactants provide a protective layer for the surfaces of metals that come into contact with minerals and gases during the fracking process. However, surfactants are not well studied, should they come into contact with humans in some way, through groundwater for example (Makki et al., 2025). This research aims to better understand the potential toxicity of surfactants on brain cell development, and potentially provide a safer alternative. To test the impact of exposure to each surfactant, one thousand microliters of fresh cell media was placed into a four-well slide. Five hundred microliters of cell culture media were added. The specific diluted surfactant solution was added to each well. Additionally, two controls were utilized with no surfactant. All slides were incubated and evaluated for cell growth and neuron formation at two (2) day intervals using digital microscopy. An evaluation of results showed that both null and alternate hypotheses were partially supported. In terms of cell growth, most compounds showed little impact, with the exception being exposure to 1-Dodecanol and Sodium n-Dodecyl sulfate. In terms of neuron development, the results supported the alternate hypothesis more clearly. Companies utilizing 1-Dodecanol should consider other surfactants this research has shown to be better alternatives with respect to brain cell impacts. If anti-corrosive surfactants need to be used, then this research would suggest that Diisononyl phthalate may be the least harmful option of the solutions tested.

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