The Effect of pH on RNA Absorption and Liberation on Mineral Surfaces

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Astrobiology is the study of life in the universe, beginning with the origin of life on Earth. This experiment measured how changing the pH of an RNA solution affects the amount of RNA absorbed onto and liberated off a mineral surface. The impact changing pH has on the absorption rate of RNA has provided insight into the growing scientific theory that life began in land-based hot springs, which are complex systems that have constantly changing pH's, not in deep sea hydrothermal vents which is the dominant accepted theory. Data was collected from 5 different minerals by measuring the amount of RNA in solution after increasing the pH. The results supported the 'complexity' of the hot spring environment, which is essential for life to form, as the results demonstrated that each mineral absorbed RNA at different rates and volumes. Although there was high variability in results regarding the correlation between increasing pH and RNA in solution for each mineral. Further investigation showed that the length of time RNA had to react with the mineral surface was a significant factor and provided insights to improve experimental design accuracy for future research. This experiment tested 'messy' (impure) minerals to simulate more realistic conditions as those found on early Earth adding a new research dimension, and more work is needed. Scientists use origin of life studies to aid the current search for past life on Mars, the key mission for NASA's Mars Perseverance rover that landed on the Martian surface on 18 February 2021.

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