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Alkaline hydrothermal vents as a potential site for thermal chemical reactions

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Simpler compounds or elements like CO₂, CH₄, H₂O (vapor), a small amount of NH₃, and CO or N₂-like materials with the continuous supply of thermal energy in hydrothermal vents can be possible to do structural modification to form stable compounds as deriving force. Alkaline hydrothermal vents are minerals-rich (Fe, Ni, S, and silica) and supplied with a temperature fluctuation of 400°C to lower as we move away from it temperature decreases significantly, high pressure, active serpentinization fluids, reductive conditions and more important difference in concentration gradient are attributing to high interaction of materials at a single site. A combination of such events at one location can increase the chances of effective collisions, leading to possible combinations with different structural modifications.

Plumes of Enceladus show the significant similarity of deep-sea hydrothermal vents condition with change in their ranges, even though the data shows 20 times more organic matter than expected in plumes. We are aimed to study the Σ CO₂ to synthesize C₂+ hydrocarbons in deep-sea hydrothermal vents in presence of rich H₂ and minerals with the chimney-like formation and the chemistry of three phases of water present on the planetary body with its possible application in biogenesis. Different research studies of analog sites and similar simulations at the laboratory favor complex material synthesis even though in an experiment the resultant shows imidazole presence. We are expected to formulate the study of potential changes in C/O/N summations with regards to the further fate of synthesized materials in deep-sea hydrothermal vents at Enceladus regarding earth even though variations are expected with natural changes in combinations of chemicals formed there. These conclusions can frame the basic information of life processes and their emergence with time and relative study of complexity increment.

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Biography

Manya Sharma is a geologist by profession, Mentor at SGAC 2022 mentoring program, and currently Heading the Department of Astrobiology at Spaceonova. successfully leaded Astrobiological research in Mars Analogue Site Expedition 2022 (MASE 2022) in strategic sites of Rajasthan, India. Certification of achievement involving the International Advanced Space Science course, and Diploma in Astrobiology from the Indian Astrobiology Research Foundation. My professionalism covers -Remote sensing, QGIS, ArcGIS Pro, encom discover, also as a global mapper & Google Earth and hyperspectral and multispectral remote sensing.

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