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# İNVESTIGATION BIOLOGICAL TRACES ON THE RED PLANET. STUDY OF PERSERVERANCE ROVER'S SHERLOC AND PIXL ANALYSES.

**Abstract**

Research on Mars' potential for life and the question of whether life once existed on the planet have long intrigued scientists, becoming one of the most extensively studied topics in the fields of astrobiology and planetary science. The analysis of the chemical composition and organic materials present in Martian surface rocks considered one of the primary sources for answering this question. Data collected through the investigations of the Perseverance Rover play a crucial role in the comprehensive analysis of Mars' geology. The research was conducted using instruments SHERLOCK (Scanning Habitable Environments with Raman Luminescence for Organics and Chemicals) and PIXL ( Planetary Instrument for X-ray Lithochemistry). The main purpose of conducting this research was to detect traces of ancient life on Mars through instruments and to evaluate the effectiveness of biological traces. Research conducted with these devices allows for a deeper study of the geogical and biological history of Mars. Based on the research framework, an analysis of the tools used in the research was analyzed using NASA open sources. The SHERLOCK instrument used Raman spectroscopy and fluorescence technologies to detect organic matter and biological indicators in Martian rocks. The chemical composition of Martian rocks clarified by X-ray fluorescence analysis using the PIXL instrument. As a result of the study, analyzes of Martian rocks with SHERLOCK and PIXL instruments were considered a powerful tool for determining the presence of organic matter in those rocks and minerals that interact with water in the past. Most importantly, as a result of the studies carried out in the Jezero crater, hydrogen-rich minerals and carbon-based compounds strengthens the possibility that Mars had conditions for life in the past. In general, analyzing Mars from a geological point of view, Earth rocks will be analyzed.