

SULFUR REDOX OF ACIDIC HOT SPRINGS AND MUDPOTS, YELLOWSTONE WY, USA

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The chemistry of 23 water samples from acidic hot springs and mudpots at Yellowstone National Park, Wyoming, USA was determined during July 1998. Samples were collected from the Mud Volcano, Rabbit Creek, Norris Geyser Basin and Artist Paint Pots areas. The temperature, pH and oxidation reduction potential (ORP) ranged from 23 to 92 C; 1.9 to 6.8; and -134 to 474 mvolts, respectively. There was a negative correlation between pH and ORP ($R=-.71$). H_2S ranged from .01 to .85 mg/l and SO_4 ranged from 45 to 2975 mg/l. pe was calculated from the H_2S/SO_4 redox couple, pH and temperature then compared to pe determined from observed ORP and temperature. There was a very good agreement between observed pe , and thermodynamically calculated pe ($R=.77$). The data falls within the rhombic sulfur field on a pe -pH diagram and sulfur was observed by X-ray diffraction in the associated sediments. These results suggest that the redox of acidic hot springs and mudpots is controlled by the sulfur system. The waters are in thermodynamic equilibrium and it is unlikely that bacterially mediated reactions play a significant role in the redox of this system.