

SCIENTIFIC COMMUNICATIONS

CINNABAR DEPOSITION IN SUBMARINE COASTAL HYDROTHERMAL VENTS, PACIFIC MARGIN OF CENTRAL MEXICO

R. M. PROL-LEDESMA,[†] C. CANET,

Instituto de Geofísica, UNAM, Cd. Universitaria, Coyoacán, 04510, Mexico, D.F.

J. C. MELGAREJO,

Departament de Cristallografia, Mineralogia i Dipòsits Minerals, Facultat de Geologia, Universitat de Barcelona, 08028 Spain

G. TOLSON,

Instituto de Geología, UNAM, Cd. Universitaria, Coyoacán, 04510, Mexico, D.F.

M. A. RUBIO-RAMOS, J. C. CRUZ-OCAMPO,

Posgrado en Ciencias de la Tierra, UNAM, Cd. Universitaria, Coyoacán, 04510, Mexico, D.F.

A. ORTEGA-OSORIO,

Grupo de Investigación en Sistemas Marinos (PIMAS), Instituto Mexicano del Petróleo, Eje Central L.C. 152, Mexico, D.F.

M. A. TORRES-VERA,

Instituto de Geografía, UNAM, Cd. Universitaria, Coyoacán, 04510, Mexico, D.F.

AND A. REYES

Institute of Geological and Nuclear Sciences, Lower Hutt, New Zealand

Abstract

Cinnabar deposition was observed in submarine hydrothermal vents at about 10 m depth in the Punta Mita area in western Mexico. The vents occur in basaltic rocks and discharge a mixture of liquid and gas at a temperature of 85°C. Tertiary ignimbrites, basaltic lava flows, and mafic intrusions crop out in Punta Mita; however, at present there is no volcanic activity in the area, and the hydrothermal vents do not possess characteristics compatible with a magmatic heat source. The water discharged by the vents is more dilute than seawater, and precious and base metal contents are below detection limits. The gas is composed mostly of nitrogen and methane, and it contains only trace amounts of He, Ar, H₂, CO₂, H₂S, and O₂.

Deposits of carbonates (calcite and aragonite), sulfides (pyrite, cinnabar, minor thallium sulfide, and galena), sulfates (barite), and phosphates (carbonate-hydroxyl apatite) were observed. Cinnabar occurs in association with thallium sulfide within pyrite crusts that line the upflow channels and cover the outflow areas near the vents.

The hydrothermal activity in Punta Mita is related to deep circulation of ground water from onshore and convective heating in the high geothermal gradient of the area. The interaction of the hot water with organic matter in the layers of sedimentary rocks produces nitrogen and methane, and mercury and other elements are leached from the volcanic and sedimentary rocks. Mercury remains in solution in the thermal fluid until it reaches the sea floor.