Gas-streaming in trachyte lava, Mount Melbourne, Antarctica

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Mt Melbourne is the only currently active volcano on the mainland of Antarctica. It is a large (2,733 m) stratovolcano composed predominantly of lavas ranging from trachyandesite to trachyte. Tephra found on and within ice layers near the summit indicate that the last major eruption was between 1862 and 1922 AD. Present activity is fumarolic.

Samples of trachyte collected from the northern side of Mt Melbourne are unexpectantly garnet-bearing. Samples are light-grey, fine-grained volcanic rock containing about 5 modal% phenocrysts. Included in the groundmass are typically anhedral garnets in patches up to 4.3 mm across. The garnets, $alm_{2.9}and_{90.8}gro_{0.9}py_{0.9}sp_{4.6}$ on average, are honey-yellow to light-green in plane-polarized light and are intergrown with groundmass feldspar, $An_{1–10}Ab_{57–74}Or_{12–41}$, producing an oikocrystic texture. Areas of groundmass surrounding garnet oikocrysts are depleted in glass, magnetite, and pyroxene. In hand-specimen this depletion is observed as white haloes around garnet.

The composition of the garnet is most similar to yellow-green andradite formed from fluids during regional metamorphism. The Mt Melbourne trachyte lavas, however, have not been metamorphosed and retain primary volcanic textures without hydrous alteration or weathering. A xenocrystic origin for the garnet is not supported by textural relations or whole-rock composition—garnet free and garnet-bearing samples both contain ca. 1 wt% CaO. The occurrence of garnet in the trachyte indicates growth during late-stage magmatic crystallization. However, garnet + augite and garnet + magnetite assemblages do not occur. The formation of garnet is interpreted to result from localized gas-streaming in the lava, reacting Ca-rich residual melt in the groundmass with augite + magnetite (or precluding their formation) according to the reaction: augite + magnetite + glass + O_2 = andradite. Thermodynamic modeling indicates formation of the oikocrystic andradite occurred above 700 °C, thus representing a higher-temperature (low pressure) example of fluid-rock interaction phenomena.

Investigation of Cadmium pollution caused by drainage from Kamioka mine, Japan -for zero emission-

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Kamioka mine is one of the largest scale mines in Japan. The Cd concentration rises out of the soil of Toyama plain when discharged drainage from this mine is not checked. Therefore Cd concentration of rice is over reference value.

Monitoring and control of strict Cd concentration of effluent in mine are necessary to prevent them. By the action of inhabitants, lawyers, scientists and refining company, the Cd discharge and concentration of the river largely decreased from 35kg/month - 8ppb in 1972 to 5.7kg - 0.06ppb in 2003.

Control of factory water is easy, but mine water and groundwater under refining factories are permanent pollution source. The groundwater contamination was found by a research of prevention of injurious from mining.

The ore bodies of Kamioka mine are composed of massive zinc-lead ore enveloped by pyrometasomatic altered zone (skarn). The boundaries among nonmineralized host rock (calcareous rocks and gneiss), skarn and ore bodies are generally sharp and ready to be distinguished. Therefore, the groundwater which left ore bodies are the clear water which does not condition heavy metal. By an effect of widely distributed calcareous host rocks, pH of surface and groundwater are generally kept in weak alkaline condition. Most of heavy metals are present as infinitesimal grain suspended solid. The judgement of clear water or clouded water is easy by on-site measurement of electric conductivity. We investigated the details of pit condition and chemical analysis of mine water, which is aimed for further decrease of load.

It was first observed that, in surface water system heavy metal load largely increases at the time of the heavy rain may overestimated previous Cd loading by this mine.

I show the analysis to establish effective technique as an example this report in Kamioka Mine. Original data lasted for 32 years from 1972 were used by the investigation.