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# A new device for continuous monitoring the CO2 dissolved in water

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The measurements of dissolved CO2 in water are common elements of industrial processes and scientific research. In order to perform gas dissolved measurements is required to separate the dissolved gaseous phase from water. We developed a new device able to separate the gases phase directly in situ and well suitable for continuous measuring the CO2 dissolved in water. The device is made by a probe of a polytetrafluorethylene (PTFE) tube connected to an I.R. spectrophotometer (I.R.) and a pump. The PTFE is a polymeric semi-permeable membrane and allows the permeation of gas in the system. Hence, this part of the device is dipped in water in order to equilibrate the probe headspace with the dissolved gases. The partial pressure of the gas i in the headspace at equilibrium (Pi) follows the Henry's law: Pi=Hi•Ci, where Hi is the Henry's constant and Ci is the dissolved concentration of gas i. After the equilibrium is achieved, the partial pressure of CO2 inside the tube is equal to the partial pressure of dissolved CO2. The concentration of CO2 is measured by the I.R. connected to the tube. The gas is moved from the tube headspace to the I.R. by using the pump. In order to test the device and assess the best operating condition, several experimental were performed in laboratory. All the test were executed in a special apparatus where was feasible to create controlled atmospheres. Afterward the device has been placed in a draining tunnel sited in the Mt. Etna Volcano edifice (Italy). The monitored groundwater intercepts the Pernicana Fault, along which degassing phenomena are often observed. The values recorded by the station result in agreement with monthly directly measurements of dissolved CO2 partial pressure.