NEW POSSIBILITIES IN THE PHASE ANALYSIS OF ROCKS WITH A DERIVATOGRAPH-C

M. Földvári

HUNGARIAN GEOLOGICAL INSTITUTE, BUDAPEST, HUNGARY

The advantages of one of the latest generation of thermoanalytical instruments of the Hungarian Optical Works (the Derivatograph-C) are summarized. The paper contains some practical examples of the phase analysis of geological samples.

The Derivatograph-C is one of the latest, microcomputer-operated generation of thermoanalytical instruments. It can be used for the simultaneous recording of thermogravimetric (TG), derivative thermogravimetric (DTG), thermogastitrimetric (TGT), differential thermoanalytical (DTA) and thermodilatometric (TD) curves. The second derivatives of the primary curves (DDTG, DDTA, etc.) can also be produced with the microprocessor. Besides dynamic thermal analytical measurements, examinations can be carried out with isothermal or quasi-isothermal heating programs. With the quasi-isothermal heating program, the rate of transformation can be regulated not only via the DTG signal, as with the Q-Derivatograph, but also in the case of the DTA or DTG curves. Investigations can be carried out in different gas atmospheres (e.g. in oxygen or in nitrogen).

The measuring and the heating control are performed by a microprocessor. During the measurement the signals are continuously loaded into the memory and are drawn on the display at the same time. The measurement results can be archivated on a disk, from which they can be recalled at any time [1].

This paper illustrates the advantages of the new apparatus for the phase analysis of rocks.

1. Data handling by computer. Rich software is available for determination of the weight change or the exact temperature at certain points of the curves and for presenting curves as a function of time or temperature. The curves can be magnified, and submitted to various mathematical operations. It is also possible to cut out certain sections of the curves and to make com-
parisons between different curves. Further possibilities are base line correction, calculation of peak area and determination of peak symmetry.

2. Sample quantity. The sample quantity is a critical question in thermal analysis. For identification, the use of a small sample quantity is favourable, as the temperature and material gradients are then negligible, the reactions take place in relatively narrow temperature intervals and the overlapping of neighbouring reactions is rare. Nevertheless, a larger sample quantity is often taken for the quantitative and qualitative phase analysis of geological samples. This permits increase of the limit of detection for certain phases, and the statistical deviation in the composition of the sample can be decreased (representative sample). A larger quantity of sample is often advantageous for the calculation of kinetic parameters. In thermoanalytical measurements, the quantity of sample varies in a relatively wide interval (1 g - 1 μg). In phase analysis, suitable sample masses range between 10 and 500 mg.

The Derivatograph-C has a semi-microelectronic and automatic balance.

![Derivatogram of vivianite](image)

**Fig. 1** Derivatogram of vivianite. Locality: Egyházaskezdő (Hungary). Sample weight: 13.8 mg.
Heating rate: 10 deg/min

Measuring domains between zero and 5, 10, 50 or 100 mg, respectively can be chosen.