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Note

Comments on the papers:

Some comments on the history of vacuum microbalance techniques

by E. Robens, C. Eyraud, P. Rochas, *Thermochimica Acta*, 235 (1994) 135–144

and

Some comments on the history of thermogravimetry

by C. Eyraud, E. Robens, P. Rochas, *Thermochimica Acta*, 160 (1990) 25–28**Author** Jenemann, H.R.

Title **Comments on the papers: Some comments on the history of vacuum microbalance techniques (by E. Robens, C. Eyraud, P. Rochas: Thermochimica Acta 235 (1994) 135-144) and Some comments on the history of thermogravimetry (by C. Eyraud, E. Robens, P. Rochas, Thermochimica Acta 160 (1990) 25-28)**

In Thermochimica Acta 254 (1995) pp. 391-392**Size** 2 pp., 16.2 x 24 cm**Publisher** Elsevier Science B.V.**Place** Amsterdam**Year** 1995**ISBN ISSN** 0040-6031**Abstract****Remarks**

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Note

There are still extant weights of the period 2600 bc, from the area of Babylon, when Gudea was King. They were made of stone in the shape of geometric or animal figures, were marked with the size of the weight and also had sacerdotal seals. In 2300 bc King Dungi of Ur in Sumeria established probably the first institute for the testing of measures. It was presided over by the priests (see, for example, P. Walden, *Maß, Zahl und Gewicht in der Chemie der Vergangenheit*, Stuttgart 1931).

Cupellation can be regarded as the earliest example of a standard method of analysis and a detailed description is given in a statute of King Philip VI of France in 1343. Even the technique of weighing is described in detail mentioning "... whoever carries out the test must take care not to burden the balance by breathing upon it..." (F. Hoefer, *Histoire de la Chimie*, Paris 1866, Vol. 1, 499–500).

It should be emphasized that the first microbalance is generally attributed to Warburg and Ihmory who were working at Freiburg University investigating the weight and origin of water films forming on glass and other materials. The first photographic recording on a thermobalance was by Skramovsky (*Coll. Trav. Chim. Tchechosl.*, 5 (1933) 6–9), but the first photographic recording of weight changes was by Kuhlmann (W.H.F. Kuhlmann, *Neue Waage zum automatischen photographischen Registrieren des Gewichtsverlustes einer Substanz*, *Der Mechaniker*, 18 (1910) 13, 146–147).

H.R. Jenemann (Schwedenstr. 7E, D-65239 Hochheim, Germany): In the same year when Kuhlmann (Hamburg) described his photographic recording balance the competitive factory of Paul Bunge (Hamburg) exposed such an instrument at Brussels (*Katalog der Kollektiv Ausstellung der deutschen Präzisions-Mechanik und Optik*, Brüssel, 1910). Both recorded the declination of the beam for small weight changes and added weights by means of relay operated by a photo cell for bigger changes so that the balance was always operated at constant load.

The first recording balance is from Paul Stückrath, 1881. The declining beam touched an electrical contact which, via a relay and a spring driven clockwork, operated a stylus and successively sliding weights to compensate the weight changes. The stepwise contact operation was recorded as a function of time (*Stückrath, Waage zur graphischen Aufzeichnung veränderlichen Gewichtes, Zeitschrift für Instrumentenkunde*, 3 (1883) 95–99).

In the Odén-Keen balance of 1924, electromagnetic force compensation was used together with electro-mechanical weight switching (J.R.H. Cottis, E.M. Crowther, B.A. Keen, S. Odén, *An automatic and continuous recording balance, Proc. Royal Soc. Series A*, 106 (1924) 33–51).

For reference see H.R. Jenemann, *Über die Grundlagen und die geschichtliche Entwicklung elektro-mechanischer Wägesysteme*, *CLB Chemie f. Labor u. Betrieb*, 36 (1985) nos. 8, 10, 12; 37 (1987) nos. 4, 5, 7, 12, esp. 36 (1985) 630–631.