SPECIAL STUDY OF VAPOR PRESSURES OF SATURATED SALT SOLUTIONS*

O. W. Rees and G. W. Land

State Geological Survey, Urbana, Illinois

AN ABSTRACT

In 1936 the American Society for Testing Materials published tentative specifications for "Classification of Coal by Rank"[1] providing that the lower rank bituminous coals be classified according to their moist mineral matter free B.t.u. values. In 1938 these specifications were advanced to standard (A.S.T.M. Designation D 388-38).[2] It was proposed that the method of Stansfield and Gilbart[3] be adopted as the standard method for determining moisture in coal having visible surface moisture for such classification. Before making this method standard, however, it seemed advisable to obtain further information as to its applicability. Accordingly a study of its application to Illinois coals was undertaken in this laboratory.

The procedure described by Stansfield and Gilbart may be described briefly as follows: Five gram portions of 14-mesh coal were brought to equilibrium at various humidities, moisture was determined on these samples, and the determined moisture values were plotted against humidity values. The curves were extrapolated to cut the 100 per cent humidity axis and this point was taken as the bed moisture of the coal. Various saturated salt solutions were used to provide the desired humidities.

As the work progressed it became desirable to confirm the values assumed to be correct for these solutions under actual working conditions. For this purpose a Rayleigh or "Rocker Arm" type of manometer[4] was used together with necessary thermostats, gauges, etc. A detailed description of the apparatus as used together with a description of the procedure followed may be found in Illinois State Geological Survey Report of Investigations No. 58. Results for saturated solutions of nine different salts, $KClO_3$, K_2SO_4, $BaCl_2.2H_2O$, KCl, NaCl, NH_4NO_3, $Ca(NO_3)_2.4H_2O$, $KC_2H_3O_2$ and $LiCl.H_2O$ were determined and compared with values taken from International Critical Tables. The results obtained compare favorably with these values.

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[1] Classification of Coals by Rank (tentative) D 388-36T. A.S.T.M. Standards on Coal and Coke, p. 98 (1936).

[2] 1938 Supplement to Book of A.S.T.M. Standards, pp. 157-162.

[3] Stansfield, Edgar and Gilbart, K. D. Transactions Amer. Inst. Mining and Met. Eng., Coal Division *101*, 125 (1932).

[4] Rayleigh. Phil. Trans. *196*, A, 205 (1901).