

DISCUSSION ON DOCUMENTATION OF THERMOCHEMICAL DATA

H. F. STIMSON (*U.S.A.*): Computations of values of thermodynamic properties are based upon the thermodynamic temperature scale. With the trend towards increased accuracy in calorimetric measurements a more exact knowledge of the thermodynamic scale is desirable. Needless to say, we would like to know the true thermodynamic temperature scale, but lacking this we use the International Scale. For thermodynamic computations the difference between scales is not yet of great importance; below the sulphur point the greatest reported difference between the scales is less than one part in 4000 of the temperature. Corrections could be made for such differences.

The International Scale, on the other hand, makes it possible to realize temperatures much more precisely and reproducibly. The definition of the International Scale can be and is being improved from time to time to make the scale more precise and reproducible without changing values on this scale by more than the experimental error of measurement. Except for temperatures above the gold point, values of temperature on this scale have remained essentially the same since 1927.

Eventually the present International Scale will be changed to one that is more closely thermodynamic. If we were to change the values of temperature on the International Scale in the present state of our knowledge, the question is, would the change be worthwhile? Frequent changes lead to more confusion than they correct. My recommendation is for more researches done with meticulous care so that systematic errors will be removed. When our accuracy is thus increased several fold over that which we have at present, then a new scale can be adopted that will definitely be more closely thermodynamic than the present International Temperature Scale.

In summary, more accurate data are needed over the entire range of the practical scale. Let us not change the values of temperature on the practical scale, however, until we can be sure the new practical scale is considerably closer to the thermodynamic. If this change is made too soon an excessive amount of confusion may result.

K. S. PITZER (*U.S.A.*): First, I would like to state my agreement with Dr Stimson in his argument against frequent changes in the temperature scale adopted by the standardizing laboratories. Frequent changes cause great confusion in later years; it is much better to make major improvements in the scale at infrequent intervals.

Secondly, I would like to suggest and hope that we may soon abandon the use of arbitrary and somewhat non-thermodynamic temperature scales just as the use of international electrical units was abandoned ten or fifteen years ago. With the new definition of the Kelvin scale in terms of the single fixed point at the triple point of water, we should be able to determine the thermodynamic scale to an accuracy as high as the present reproducibility

of working thermometers. Then there would be no need to define an arbitrary scale such as the present International Scale. Instead, the standardizing laboratories could calibrate working thermometers on the thermodynamic, Kelvin, scale to the full accuracy to which the thermometer was expected to reproduce its behaviour.

I realize that there are many difficulties to be overcome before such a change is possible, and I do not pretend to see how best to overcome these obstacles. I just want to emphasize that we here at this meeting and, in my opinion, most of those who need precise temperature measurements are dealing with thermodynamic temperature. Thus any new working temperature scale should certainly agree completely with the knowledge of the thermodynamic scale at the time of adoption. Also one would hope that the present uncertainties in the thermodynamic scale, which have been referred to today, will be removed soon.

H. MOSER (*Deutschland*): Wie ich in meinem Vortrag erwähnt habe, stimmen die Messungen verschiedener Autoren über die Abweichungen zwischen der thermodynamischen und der Internationalen Temperaturskala noch nicht so gut überein, um jetzt schon eine Angleichung der zweiten Skala an die erste zu ermöglichen. Es sind jedoch bereits Messungen in weiteren Staatslaboratorien über dasselbe Problem im Gange, die voraussichtlich in einigen Jahren abgeschlossen sein dürften. Erst dann wird man entscheiden können, ob eine Änderung der internationalen Skala zweckmäßig und sinnvoll ist.

Es wird auf lange Zeit nicht möglich sein, die Genauigkeit thermodynamischer Temperaturmessungen so zu steigern, daß sie mit der Reproduzierbarkeit eines Gebrauchsthermometers (wie z.B. des Platinwiderstandsthermometers) vergleichbar ist. Da gasthermometrische Messungen außerdem viel schwieriger durchführbar sind als diejenigen nach den Verfahren der jetzigen Internationalen Temperaturskala, wird man auf diese nicht verzichten können. Eine andere Bezeichnung für diese konventionelle Skala, etwa der Name "Praktische Internationale Temperaturskala" erscheint zweckmäßig. Entsprechende Vorschläge sind bereits gemacht.