

**RECOMMENDATIONS OF THE
CONSULTATIVE COMMITTEE FOR THERMOMETRY
SUBMITTED TO THE INTERNATIONAL COMMITTEE FOR WEIGHTS AND
MEASURES**

**RECOMMENDATION T 1 (2014)
On a new definition of the kelvin**

The Consultative Committee for Thermometry (CCT)

recalling

- the CCT Report to the CIPM in 2007, “Report to the CIPM on the implications of changing the definition of the base unit kelvin”;
- the CCT Recommendation to the CIPM in 2010, “Considerations for a new definition of the Kelvin”, CCT T 2 (2010);

welcoming

- the Resolution 1 (2011) of the CGPM, “On the possible future revision of the International System of Units, the SI” which, when accomplished, will link the unit of temperature to the Boltzmann constant;
- the CCU Recommendation to the CIPM, “Revision of the International System of Units, the SI”, CCU U 1 (2013);

recognizing

the need to confirm and clarify Recommendation CCT T 2 (2010) in the light of Resolution CCU U 1 (2013);

noting that

- experiments such as acoustic gas thermometry, dielectric constant gas thermometry, Johnson noise thermometry, and Doppler broadening thermometry represent fundamentally different methods to determine the Boltzmann constant k ;
- the CODATA recommended a value for k with a relative standard uncertainty equal to 9.1×10^{-7} in its 2010 adjustment of fundamental constants, however based on only one experimental method;
- a relative standard uncertainty in k of 9.1×10^{-7} would correspond to a standard uncertainty of about 0.25 mK of the temperature of the triple point of water after the redefinition;

considering

- the discussions held at the 26th and 27th meetings of the CCT in 2012 and 2014;
- the considerable progress recently achieved in experimental determinations of the Boltzmann constant to improve confidence in the 2010 value, as reported at the CCT “Task Group on the SI” meetings held in 2013 and 2014;

- that additional results are anticipated before the end of 2015;
- that experimental progress has allowed the development of a *mise en pratique* for the new definition of the kelvin, which has been extended to cover direct measurement of thermodynamic temperature after the new definition of the kelvin;

recommends

that the CIPM request the CODATA to adjust the values of the fundamental physical constants, from which a fixed numerical value of the Boltzmann constant will be adopted, when the following two conditions are met:

1. the relative standard uncertainty of the adjusted value of k is less than 1×10^{-6} ;
2. the determination of k is based on at least two fundamentally different methods, of which at least one result for each shall have a relative standard uncertainty less than 3×10^{-6} .