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

RECOMMENDATION T 1 (2017)

For a new definition of the kelvin in 2018

The Consultative Committee for Thermometry (CCT), at its 28th meeting in 2017,

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),
- the CCT Recommendation to the CIPM in 2014, "On a new definition of the kelvin", CCT T 1 (2014),

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),

***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 5.7 parts in 10^7 in its 2014 adjustment of fundamental constants,
- a relative standard uncertainty in k of 5.7 parts in 10^7 would correspond to a standard uncertainty of about 0.16 mK of the temperature of the triple point of water after the redefinition,
- the temperature of the triple point of water will be 273.16 K at the time of the redefinition of the kelvin,

considering

- the discussions held at the 26th, 27th, and 28th meetings of the CCT in 2012, 2014 and 2017;
- the considerable progress recently achieved in experimental determinations of the Boltzmann constant to improve confidence in the 2014 value, as reported at the CCT "Task Group on the SI" meetings held in 2014, 2015, and 2017,
- that the determination of k is based now on three fundamentally different methods, of which at least one result for each has a relative standard uncertainty less than 3 parts in 10^6,
- that all requirements of CCT for the new definition of the kelvin have been fulfilled,
- that experimental progress has allowed the development of a *mise en pratique* for the realization of the kelvin, which has been extended to cover direct measurement of thermodynamic temperature after the redefinition of the kelvin,

recommends

- that the CIPM finalises the unit redefinitions through agreeing to fix the values of the fundamental physical constants, from which a fixed numerical value of the Boltzmann constant with 8 digits will be adopted for the redefinition of the kelvin,
- that member state NMIs take full advantage of the opportunities for the realisation and dissemination of thermodynamic temperature afforded by the kelvin redefinition and the *mise en pratique* for the definition of the kelvin.