Astronomy From Å to ZZ — Howard L. Cohen

A Brief Column for the Beginning Stargazer Introducing a New Astronomical Term Each Month

Astronomy is rich with terminology. This column will help beginning stargazers ease into the world of astronomy by *briefly introducing* a new but *basic astronomical term* (word, acronym or abbreviation) each month. This list, which began January 1999 with the letter *a*, is alphabetical but uses successive letters for each month's entry. (We will return to the letter *a* after twenty-six months.)

Word of the Month for November 1999

kelvin (K)   The SI (Système International or International System) unit of temperature. One kelvin (K) is the same temperature interval as one degree on the Celsius (Centigrade) scale.

The **Kelvin scale**, however, begins at -273.16° Celsius (C). On the Kelvin scale, water freezes at 273.17 K (0° C) and boils at 373.13 K (100° C).

Temperatures recorded on the Kelvin scale are not written degrees kelvin (°K) but simply as kelvin (K) without the degree symbol.

In astronomy, temperatures of stars and most other celestial objects are recorded on the Kelvin scale.

The kelvin is formally defined as a unit of thermodynamic (i.e., absolute) temperature equal to 1/273.16 of the thermodynamic temperature of the triple point of water—the temperature at which steam, ice and water are at equilibrium.

This unit is named for the man who first proposed using this scale, William Thompson, First Baron Kelvin (1824–1907), a Scottish physicist (born in Ireland) and one of the founders of the modern science of thermodynamics.

The zero point on the Kelvin scale is known as *absolute zero* (0 K) and so this scale was formerly known as the absolute temperature scale. On this scale temperatures are directly related to the energy possessed by matter. Thus, kelvins are regarded as a measure of thermodynamic temperatures. As such, the Kelvin scale is preferred when discussing relations dealing with the physical properties of materials.

To become familiar with kelvins, *do not convert* to other temperature units. Instead, use the following tips to become acquainted with the Kelvin scale.

1. One kelvin equals one Celsius degree.

2. Ambient room temperatures are about 300 K.

3. At high temperatures (about 2,000 K or more), Kelvin and Celsius temperatures are *approximately* the same. (Example: 6,000 K is *approximately* 6,000 C.)

(Technically Kelvin temperatures are about 273 degrees higher than Celsius temperatures but stellar temperatures are not known precisely. So equating K and C approximates the Celsius temperature if temperatures are in the thousands.)

4. At high temperatures a Kelvin temperature is about one-half of the Fahrenheit temperature. (Actually the ratio is closer to 5/9.) Example:11,000° F is approximately 6,000 K

5. Learn the *Sun's surface temperature is about 6,000 K* and use this value for comparison. Thus, the Sun's surface is about twenty times hotter than typical ambient room temperatures (300 K).

Examples: If a star's temperature is 3,000 K, then this star is approximately one-half as hot as the Sun. If a star's temperature is 18,000 K, the star is approximately three times hotter than the Sun.   ☼

References. J. Mitton 1991, *Concise Dictionary of Astronomy* (Oxford Univ. Press); I. Ridpath 1997, *A Dictionary of Astronomy* (Oxford Univ. Press).