

Additional Material – States of Matter

Solid changes to liquid with an increase in temperature. Near absolute zero, a substance exists as a solid. As heat is added to this substance it melts into a liquid at its melting point, boils into a gas at its boiling point. If heated high enough matter goes into plasma state, in which the electrons are so energized that they leave their parent atoms.

Plasma is not a common state of matter on Earth, but may be the most common state of matter in the universe. Plasma consists of highly charged particles with extremely high kinetic energy. The noble gases (helium, neon, argon, krypton, xenon and radon) are often used to make glowing signs by using electricity to ionize them to the plasma state. Stars are essentially superheated balls of plasma.

In 1995, scientists created a new state of matter, the Bose-Einstein condensate (BEC). BEC is made using a combination of lasers and magnets. Eric Cornell and Carl Weiman cooled a sample of rubidium to within a few degrees of absolute zero. At this extremely low temperature, molecular motion comes very close to stopping altogether. Since there is almost no kinetic energy being transferred from one atom to another, the atoms begin to clump together to form one super atom called Bose-Einstein condensate.