SPH3U 6.1 Warmth and Coldness

1. Vibrations of atoms and molecules

Kinetic molecular theory:	objects are made up of particles that attract each other (potential energy) and move around (kinetic energy).

Solids	Liquids	Gases
heat: particles vibrate faster.	heat: particles vibrate faster and move from place to place.	heat: particles move around faster.

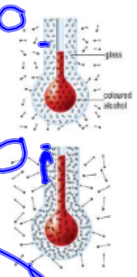
melting → ← freezing

boiling → ← condensation

Thermal energy:	total kinetic and potential energy possessed by a substance's particles.
transfer	only transferred from hot objects to cold objects.

2. Temperature and thermometers

Temperature:	the average kinetic energy of the particles.
thermometer	a device to measure temperature. made of glass, with mercury or alcohol inside the tube.



Celsius scale	Fahrenheit scale	Kelvin scale
0°C: melting point of water. 100°C: boiling point of water.	0°F: Melting point of brine. 100°F: Boiling point of brine. (32°F → 212°F: water)	Celsius + 273. 0K = absolute zero (no KE)

$T_C = T_K - 273$

$T_K = T_C + 273$

Ethyl alcohol boils at 78.3°C. What is this temperature in kelvins?

$T_K = T_C + 273 = 78.3 + 273 = 351.3\,K$.

Ethyl alcohol freezes at 159 K. What is this temperature in degrees Celsius?

$T_C = T_K - 273 = 159 - 273 = -114\,°C$.

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