

Temperature

Temperature: is a *measure* of **hotness** or **coldness** of an object.

Basic Temperature Scales

	Celsius	Kelvin	Fahrenheit	Rankine
Boiling	100 C	373 K	212 F	672 R
Freezing	0 C	273 K	32 F	492 R
Absolut Zero	-273 C	0 K	-460 F	0 R

Converting equations

$T_C = \frac{5}{9}(T_F - 32)$	$T_K = T_C + 273$	$T_R = T_F + 460$	$T_F = \frac{9}{5}(T_C + 32)$
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Heat	is a form of <i>internal kinetic</i> and <i>potential energy</i> contained in an object.		
	<i>transferred</i> from an object at a <i>higher temperature</i> to one at a <i>lower temperature</i> .		
	*Heat cannot be stored. Heat is a transformed energy.		
	Units	SI system = Joule (J).	
		U.S. system = ft lb.	
	Other Units	SI system\Metric = kilocalorie (kcal) (Cal).	
U.S. system = Btu (British thermal unit).			
Conversation factor		$1 \text{ kcal} = 4190 \text{ J} \quad \dots \quad 1 \text{ cal} = 4.19 \text{ J}$	
		$1 \text{ Btu} = 778 \text{ ft lb}$	

Specific Heat	The specific heat of a substance is the amount of heat necessary to change the temperature of 1kg of its 1C (SI) or 1 lb of it 1F (U.S.)		
	SI system	$Q = cm\Delta T$	<i>c</i> = specific heat <i>Q</i> = heat <i>m</i> = mass <i>w</i> = weight ΔT = change in temperature
	U.S. system	$Q = cw\Delta T$	

Density

Density: is a property of all three states of matter.

Generally, density increases with decreasing temperature.

Exception is water for which ice is less dense than liquid water

Mass Density	Weight Density
Is defined as mass per unit volume.	Is defined as weight per unit volume.
$D_m = \frac{m}{V}$ D_m = mass density <i>m</i> = mass <i>V</i> = volume	$D_w = \frac{F_w}{V}$ D_w = weight density F_w = weight <i>V</i> = volume

Change of Phase

is a change in a substance from one form of matter (solid, liquid, or gas) to another.

* No temperature change during change of phase.

Fusion		Vaporization	
The change of phase from solid to liquid is called melting or fusion .		The change of phase from liquid to a gas or vapor is called vaporization .	
The change from liquid to solid is called freezing or solidification .		The reverse process is called condensation (gas → liquid) .	
<i>Heat of fusion L_f</i>		<i>Heat of vaporization L_v</i>	
SI system	U.S. system	SI system	U.S. system
$L_f = \frac{Q}{m}$	$L_f = \frac{Q}{w}$	$L_v = \frac{Q}{m}$	$L_v = \frac{Q}{w}$

Elasticity

is a measure of a deformed object's ability to return to its original size and shape once the outside forces are removed. (like stretch and squeeze a rubber ball).

The Elastic Limit	Stress
is the point beyond which a deformed object cannot return to its original shape.	Is the ratio of the outside applied force, which tends to cause a distortion, to the area over which the force acts.
Stress basic types: - <ol style="list-style-type: none"> 1. Tension 2. Compression 3. Shear 4. Torsion 5. Bending 	$S = \frac{F}{A}$ <p>S = stress, usually in N/m^2 (Pa) or lb/in^2 (psi) F = force applied, N or lb, perpendicular to the surface to which it is applied A = area, m^2 or in^2</p>
Strain	Stress cause strain. (Strain is unit less). Strain is the deformation of an object due to an applied force. $\text{Strain} = \frac{\text{Change (lengh. volum. area)}}{\text{Original (lengh. volum. area)}}$
Hook's Law	$k = \frac{F}{\Delta l}$ <p>Δl = change in length Δ (the Greek letter delta) = "change in." F = applied force k = elastic constant</p>