Chapter 16 – 18: UNITS

	MKS (SI)	CGS	US Customary
Force	N $\left(= \text{Newton} = \frac{\text{kg}\cdot\text{m}}{\text{s}^2}\right)$	dyne $\left(= \frac{\text{g}\cdot\text{cm}}{\text{s}^2}\right)$	lb (= pound)
Pressure $= \frac{F_\perp}{A}$	Pa $\left(= \frac{\text{N}}{\text{m}^2}\right)$	$\frac{\text{dyne}}{\text{cm}^2}$	$\frac{\text{lb}}{\text{in}^2}$
Mass	kg	g (= gram)	slug $\left(= \frac{\text{lb}\cdot\text{s}^2}{\text{ft}}\right)$
Speed	$\frac{\text{m}}{\text{s}}$	$\frac{\text{cm}}{\text{s}}$	$\frac{\text{ft}}{\text{s}}$
Thermal energy = Q Same units used for Internal energy (U), work (W), and kinetic energy (KE)	J (=Joule)	cal	Btu (=British Thermal Unit)
Specific Heat = c	$\frac{\text{J}}{\text{kg}\ ^\circ\text{C}}$	$\frac{\text{cal}}{\text{g}\ ^\circ\text{C}}$	$\frac{\text{Btu}}{\text{lb}\ ^\circ\text{F}}$
Latent Heat = L	$\frac{\text{J}}{\text{kg}}$	$\frac{\text{cal}}{\text{g}}$	$\frac{\text{Btu}}{\text{lb}}$
Coefficient of Thermal Expansion = α	$\frac{1}{^\circ\text{C}}$	$\frac{1}{^\circ\text{C}}$	$\frac{1}{^\circ\text{F}}$
Coefficient of Volume Expansion = β	$\frac{1}{^\circ\text{C}}$	$\frac{1}{^\circ\text{C}}$	$\frac{1}{^\circ\text{F}}$
Number of moles = n	mol (= mole)	mol	mol
Power $= \frac{Q}{t}$	$\frac{\text{J}}{\text{s}}$ (=Watt)	$\frac{\text{cal}}{\text{s}}$	$\frac{\text{Btu}}{\text{hr}}$
Thermal Conductivity = k	$\frac{\text{J}}{\text{m}\cdot\text{s}\cdot^\circ\text{C}}$	$\frac{\text{cal}}{\text{cm}\cdot\text{s}\cdot^\circ\text{C}}$	$\frac{\text{Btu}\cdot\text{in.}}{\text{hr}\cdot\text{ft}^2\cdot^\circ\text{F}}$
Molecular Mass = M	$\frac{\text{kg}}{\text{kmol}}$	$\frac{\text{g}}{\text{mol}}$	
Molar Specific Heat = C	$\frac{\text{J}}{\text{mol}\cdot\text{K}}$	$\frac{\text{cal}}{\text{mol}\cdot^\circ\text{C}}$	
Entropy = S $= \frac{Q}{T}$	$\frac{\text{J}}{\text{K}}$	$\frac{\text{cal}}{^\circ\text{C}}$	$\frac{\text{Btu}}{^\circ\text{F}}$

Some temperature conversions:

Celsius (centigrade) to Fahrenheit: $T_F = \frac{9}{5} T_C + 32^\circ$

Celsius to Kelvin (absolute): $T = T_C + 273$

For temperature *differences*: $\Delta T = \Delta T_C$ and $\Delta T_F = \frac{9}{5} \Delta T_C$

Energy conversion:

1 kcal = 1000 calories = 4186 J = 3.968 Btu

tera (T) = 10^{12}	kilo (k) = 10^{3}	micro (μ) = 10^{-6}
giga (G) = 10^{9}	centi (c) = 10^{-2}	nano (n) = 10^{-9}
mega (M) = 10^{6}	milli (m) = 10^{-3}	pico (p) = 10^{-12}

α	A	Alpha	η	H	Eta	ν	N	Nu	τ	T	Tau
β	B	Beta	θ	Θ	Theta	ξ	Ξ	Xi	υ	Y	Upsilon
γ	Γ	Gamma	ι	I	Iota	ο	O	Omicron	ϕ	Φ	Phi
δ	Δ	Delta	κ	K	Kappa	π	Π	Pi	χ	X	Chi
ε	E	Epsilon	λ	Λ	Lambda	ρ	P	Rho	ψ	Ψ	Psi
ζ	Z	Zeta	μ	M	Mu	σ	Σ	Sigma	ω	Ω	Omega