

### Thermal Energy

**Thermal Energy** total energy of molecules in a substance

*thermal energy is proportional to the no. of molecules*

**Total Energy** the sum of the potential and kinetic energies

**Temperature** the average kinetic energy of molecules in matter

**Thermal equilibrium** a state in which two substances have the same temperature

**Transmission of Thermal Energy** conduction - convection - radiation

**Calorimeter** an object used to measure the heat of chemical and physical reactions

### Intermolecular Forces in Fluids

**Intermolecular Forces** Forces between molecules

**Cohesive Force** Attractive forces between molecules of the same type, such as surface tension

**Surface Tension** the property of the surface of a liquid that allows it to resist external forces

**Adhesive Forces** Forces of attraction between a liquid and a solid, such as capillarity

### Intermolecular Forces in Fluids (cont)

**Applications of Capillarity** clothes absorbing water, and water moving up stems to leaves

**Pascale's Principle** states that, in a fluid at rest in a closed container, a pressure change in one part is transmitted without loss to every portion of the fluid and to the walls of the container.

**Application of Pascale's Principle** Hydraulic Lift

**thermo-couple** a sensor that detects temperature

### Specific Heat

**Specific Heat** The amount of heat energy required to raise one kg of matter by 1 degree C

**Transferred Heat Energy Formula**  $Q = mc\Delta T$  (c is the specific heat)

**latent heat of fusion** the amount of heat energy required to melt 1 kg of a substance

**latent heat of fusion formula**  $Q = mH_f$  ( $H_f$  = heat of fusion)

**Latent Heat Of Vaporization** the amount of heat energy required to evaporate 1 kg of a substance

**Latent Heat Of Vaporization Formula**  $Q = mH_v$  ( $H_v$  = heat of vaporization)

### Buoyant Force and Liquid Pressure

**Fluid's Pressure**  $P = \rho gh$  ( $\rho$  = density,  $g = 9.8$ ,  $h$  = height)

**Archimedes' principle** states that a body immersed in a fluid is subjected to an upward force equal to the weight of the displaced fluid

**Buoyant Force** the force acting on an object opposite to gravity by a fluid in which it is submerged, opposing the weight

**Buoyant Force Formula**  $F = \rho(\text{fluid})Vg$

**applications of the buoyant force** ships, submarines

**Viscosity** a measure of an object's resistance to flow

**Bernoulli's principle** states that in horizontal fluids, the higher the velocity, the lower the pressure

**applications of bernoulli's principle** spray paint, perfume atomizer

**Solid Expansion** a change in the length, width, or height of a solid

same depth = same pressure



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### Thermodynamics

The First Law  
Of Thermo-  
dynamics

$$E = Q - W$$

The Second  
law Of  
Thermodyn-  
amics

the law of entropy

Entropy

The measure of a  
system's useless thermal  
energy, or disorder

Entropy  
Formula

$$\Delta S = Q/T$$

Heat Engine

a device that converts  
thermal energy into work

Efficiency of a  
Heat Engine

$$\text{Eff} = W/Q_h \text{ or } \text{Eff} = (Q_h - Q_c / Q_h)$$

Heat engine  
energy  
relations

$$Q_h = W + Q_c$$

Density

$$\text{density} = m/V$$

Pressure

$$P = F/A$$



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