

# Thermal Energy

Movement

Conduction

Convection

Radiation

# Thermal Energy

## Important terms

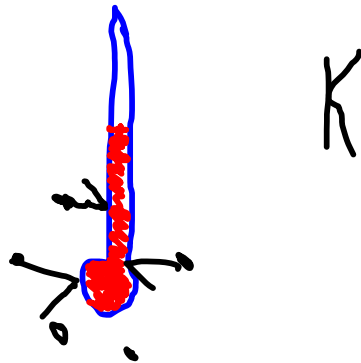
Kinetic theory of matter

stuff is made of atoms which are moving

thermal energy Total kinetic energy of the atoms

Heat Transfer of Energy from high to low

Temperature measure of AVERAGE kinetic energy



## Calculation of thermal energy

$Q$  = change in thermal energy J

$m$  = mass in kg

$C_p$  = specific heat  $Q = m C_p \Delta t$

$\Delta$  = change in  
(final - initial)

$\frac{J}{kgK}$  amount of energy  
needed to raise 1kg  
of substance 1K ( $^{\circ}C$ )

$t$ : temperature  $K$  or  $^{\circ}C$

P. 432

P 843

Practice p434 1-6

How much energy?

$$Q = m C_p \Delta T$$

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$$Q = .755 \text{ Kg} \cdot 449 \frac{\text{J}}{\text{KgK}} \left( \frac{403\text{K} - 283\text{K}}{120\text{K}} \right)$$

$$Q = 40,679.4$$

$$Q = 40,700 \text{ J}$$

## Writing assignment

[http://www.energystar.gov/ia/business/bulk\\_purchasing/bpsavings\\_calc/Calc\\_Furnaces.xls](http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/Calc_Furnaces.xls)



[http://www.we-energies.com/residential/energyeff/energyeff\\_links.htm](http://www.we-energies.com/residential/energyeff/energyeff_links.htm)



Building Shell Type	Minimum Efficiency Requirements
Attic Insulation	As near as possible to R-38
Wall Insulation	Fill to Capacity
Exterior Wall Insulation (under siding)	R-5
Sillbox Insulation	R-11 to R-19
Basement Wall Insulation	R-5 (exterior) or R-11 (interior)
Crawl Space Insulation	Fill between joist
Replacement Windows	Low E Glass, Double to triple pane and Argon gas filled or Thermopane R-4
Replacement Exterior Doorss	Urethane core R-13.5 or Polystyrene core R-7.5
Storm Windows and Doors	All Units
Roofing	Installed according to local requirements
Siding	Installed according to local requirements

