

Heat = Energy that is transferred as a result of differences in temperature.

Temperature = The amount of kinetic energy contained in the particles of a substance.

Law of Conservation of Energy = Energy cannot be destroyed, only changed from one form to another (heat lost=heat gained).

Specific Heat = amount of energy needed to raise 1g by 1°C

Temperature

$$C^{\circ} = (F^{\circ} - 32) \times 5/9$$

Specific Heat

$$c = 4.18 \text{ J/g}^{\circ}\text{C}$$

Heat Energy

$$Q = mc\Delta T$$

Water

$$1 \text{ g} = 1 \text{ ml}$$

$$\text{Mass}_{\text{H}_2\text{O}} = \text{Vol}_{\text{H}_2\text{O}}$$

Boiling Point = 100°C

Freezing Point = 0°C

Absolute Zero = -273°C

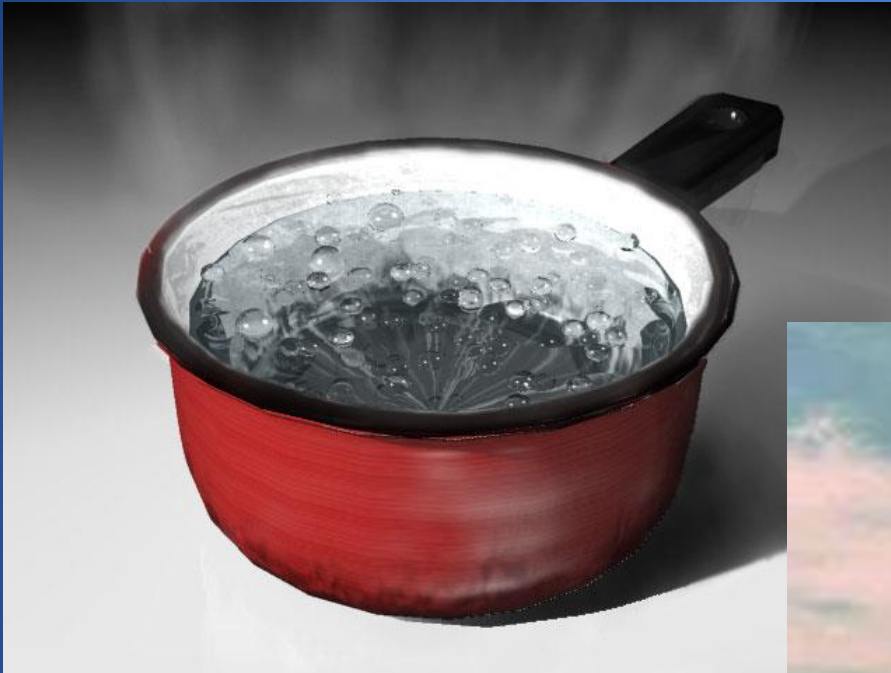
Density_{H₂O}

1 g/ml

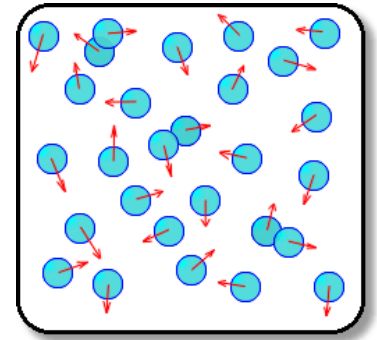
Heat vs. Temperature



Which object contains the most heat, a pot of boiling water or a gigantic frozen iceberg?



Heat



- Heat = total energy caused by molecular motion of particles
- “thermal energy”
- Depends on speed of particles
- Depends on quantity of particles (total number, size, & mass)
- Depends on type of particles

Heat is a transfer of energy.

Symbol – Q

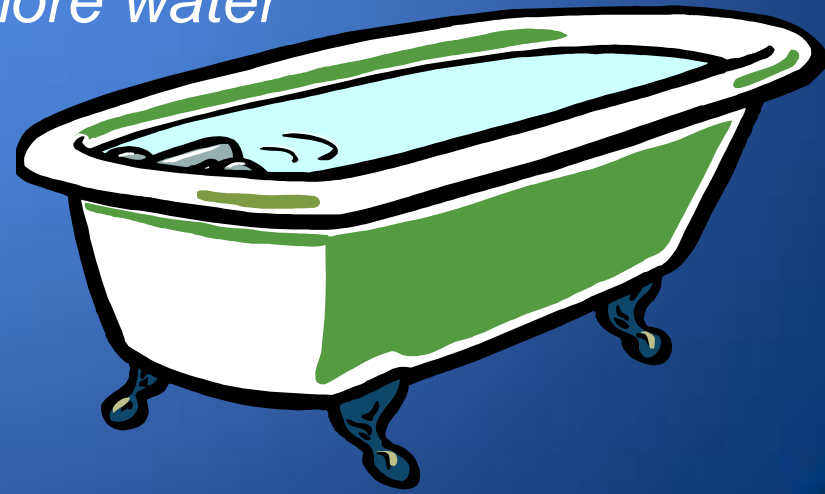
Unit - J

Temperature

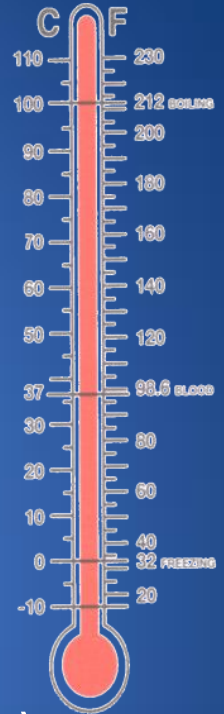
- Temp. = measure of kinetic energy of molecular motion of particles
- Does not depend on size or type
- *Example:*
- *same temperature*

more HEAT (more thermal energy)

more water



Thermometer Comparisons

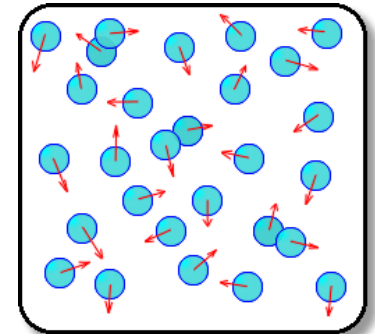


Temperature is the heat flow
between things

Symbol – T

Unit - °C

- Heat will increase or decrease the temperature of an object.
- *Add heat = increase temperature*
- *Remove heat = decrease temperature*
- Higher temperatures means the molecules are moving, vibrating, and rotating with more energy.



Which object contains the most heat?



Hint: Heat depends on the mass of substance present.

Cold does not transfer.

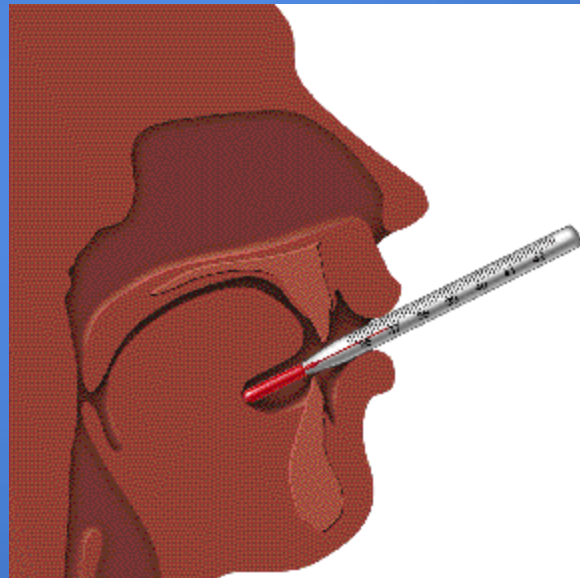
Only heat transfers.

Cold is the absence of heat.

Absolute zero	-273.15 °C
Lowest recorded natural temperature on Earth (Antarctica - July 21, 1983)	-89 °C
Ice & salt mixture (like for homemade ice cream)	-17.78 °C
Water freezes	0 °C
Average surface temperature on Earth	15 °C
Average human body temperature	36.8 °C
Highest recorded temperature on Earth (Libya - 1922)	58 °C
Water boils	100 °C
Titanium melts	1668 °C
Surface of the Sun	5526 °C

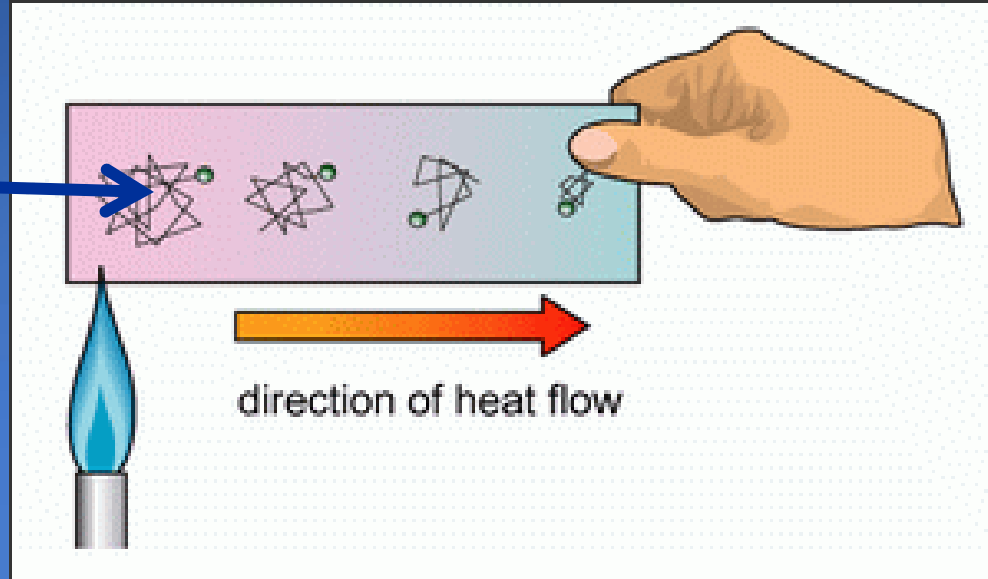
Final Review:

1. Heat is energy.
2. Temperature is a *measure* of it.



Conductors promote heat transfer

Kinetic energy of particles of matter



Insulators inhibit heat transfer

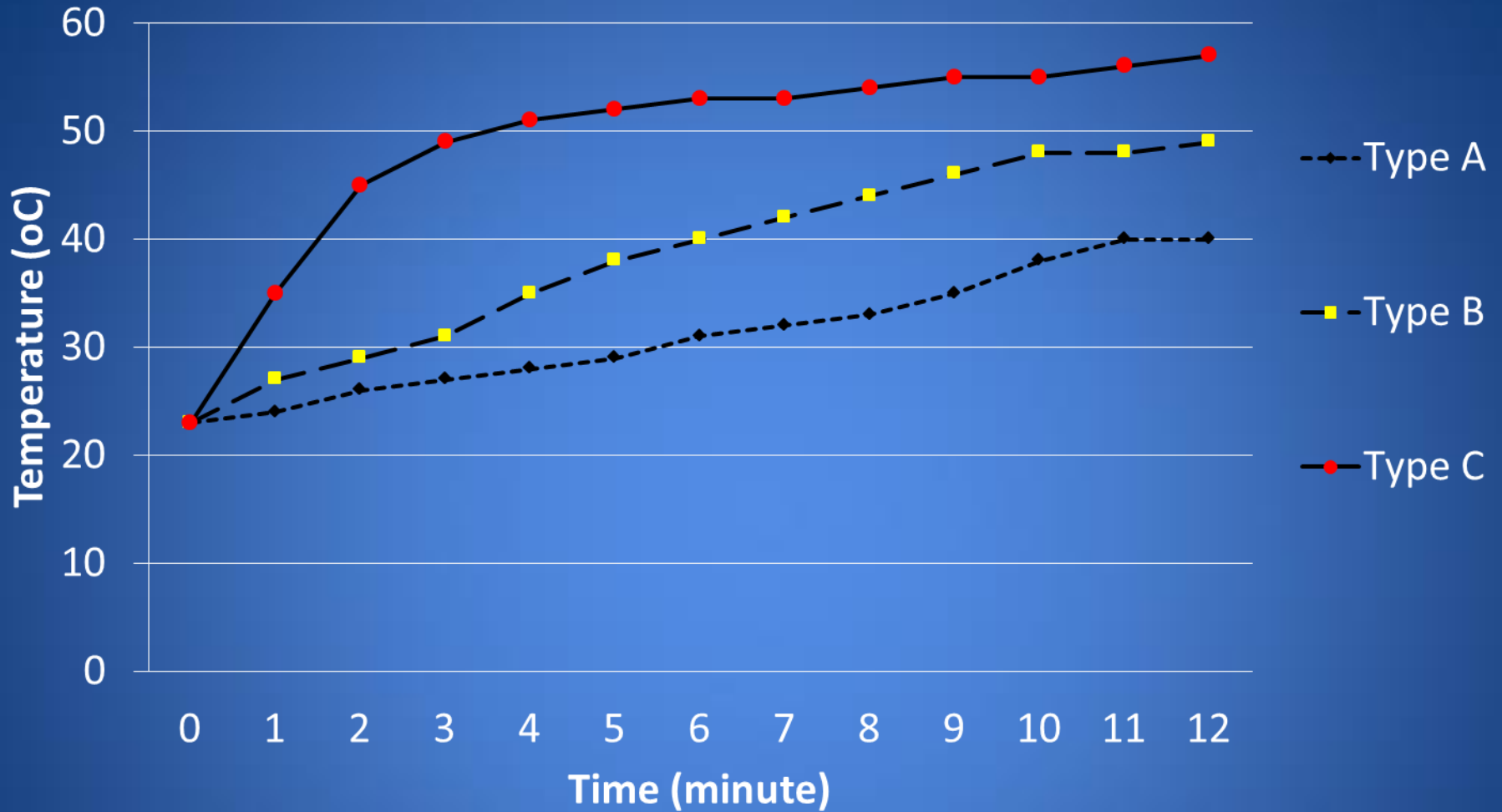


Keeping heat IN!



Keeping heat OUT!

Type of Insulation and Temperature



Which insulator is best at keeping the temperature constant (not transferring)? Type A