2nd equation for Thermodynamics (Old 2nd Law and Entropy)

Experimental evidence shows that the 2^{nd} equation of thermodynamics predicts:

- Heat flow from hot to cold.
- Photons are absorbed by electrons in atoms and molecules by the electrons of atoms and molecules with the lowest temperature.
- Photons are emitted by electron of atoms and molecules by the electrons of atoms and molecules with the highest temperature.

The 2nd equation is: $T = (M\vec{a}d)_{\text{initial-internal-}\varepsilon\alpha} + (M_{ab}\vec{a}d)_{in} + (M_{em}\vec{a}d)_{out}$

$\left(initial - \text{internal} - \varepsilon\alpha\right.$ is the temperature in the local environment$\left.\right)$

Units:

(IT Units) An international calorie per gram per degree Celsius (cal(IT)/g·°C) is a metric unit of specific heat capacity. A material has the heat capacity of 1 cal(IT)/g·°C if heat energy of one international calorie is required to raise the temperature of one gram of this material by one degree Celsius.

(SI Units) A joule per kilogram per kelvin (J/kg·K) is a SI derived unit of specific heat capacity. A material has the heat capacity of 1 J/kg·K if heat energy of one joule is required to raise the temperature of one kilogram of this material by one kelvin.

(Other Units) A $\left[(kg)(m/s^2)(m)/(kg)(^oC)\right]$ is a metric unit of specific heat capacity. A material has the heat capacity of $\left[1(kg)(m/s^2)(m)/(kg)(^oC)\right]$ if heat $(M\vec{a}d)$ of $\left[1(kg)(m/s^2)(m)\right]$ is required to raise the temperature of one kilogram of this material by one degree Celsius.

A $\left[(kg)(m/s^2)(m)/(kg)(^oT)\right]$ is a metric unit of specific heat capacity. A material has the heat capacity of $\left[1(kg)(m/s^2)(m)/(kg)(^oT)\right]$ if heat $(M\vec{a}d)$ of $\left[1(kg)(m/s^2)(m)\right]$ is required to raise the temperature of one kilogram of this material by one degree $(T_{absolute})$

1 calorie (IT)/gram/°C [cal/(g·°C)] = 4186.800000009 joule/kilogram/°C [J/(kg·°C)]

1 calorie (IT)/gram/°C = 4186.800000009 joule/kilogram/T

PROBLEMS:

1: $(M = 20g = 0.02kg)$ of ice at $(0^o C = 273^o T)$ melts to water at $(0^o C = 273^o T)$.

?: How much does the $\left[\frac{(M\vec{a}d)_{\text{initial-internal-}\varepsilon\alpha} + (M_{ab}\vec{a}d)_{in} + (M_{em}\vec{a}d)_{out}}{T}\right]$ change in the process?

A: As the electrons in the water molecules slowly absorbing photons, the ice melts to liquid water.

- $\left(H_f = 80\, cal/g = 334720(kg)(m/s^2)(m)/kg\right)$

$$\begin{bmatrix} (M_{ab}\vec{a}d)_{in} = MH_f = (20g)(80\, cal/g) = 1600cal & \text{IT units} \\ (0.02kg)(334720(kg)(m/s^2)(m)/kg = 6695(kg)(m/s^2)(m) & \text{SI units} \end{bmatrix}$$

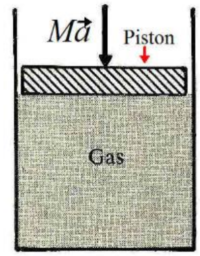
$$\begin{bmatrix} \frac{(M_{ab}\vec{a}d)_{in}}{T} = \frac{1600cal}{273^o} = 5.86\, cal/T & \text{IT units} \\ \frac{6695}{273^o} = 24.5(kg)(m/s^2)(m)/T & \text{SI units} \end{bmatrix}$$

OBSERVE that the $[(M\vec{a}d)_{\text{initial-internal-}\varepsilon\alpha}]$ increased when the electrons in the ice absorbed photon (mass) during the change from ice to water. Even though there is no measurable temperature change, the temperature HAD to change; mass was absorbed.

NOTE: Schaum's statement: Upon melting, the entropy (and disorder) increased.

JK: As knowledge increases, it is necessary to abandoned many perceptions which are no longer logical. Professor Kanarev's work has described heat to exactly duplicate experiments. Entropy should be abandoned. The illogical concept of order and disorder should be abandoned. Nothing is happening but the absorption and emission of photons by electrons in atoms and molecules.

2: An ideal gas is confined to a cylinder by a piston. The piston is slowly pushed down so that the temperature of the gas remains at $(20^o C = 293^o T)$. During the compression, $\left[730(kg)(m/s^2)(m)\right]$ of $[(M_{em}\vec{a}d)_{out}]$ was done on the gas.



?: Find the $\left[\dfrac{(M\vec{a}d)_{\text{initial-internal-}\varepsilon\alpha} + (M_{ab}\vec{a}d)_{in} + (M_{em}\vec{a}d)_{out}}{T}\right]$ change in the process?

A: The 1st equation tells us that: $[\varepsilon\alpha = (M\vec{a}d)_{\text{initial-internal-}\varepsilon\alpha} + (M_{ab}\vec{a}d)_{in} + (M_{em}\vec{a}d)_{out}]$

Because the process did not have a temperature change, the $[(M\vec{a}d)_{\text{initial-internal-}\varepsilon\alpha}]$ of the gas did not change. Therefore $[(M\vec{a}d)_{\text{initial-internal-}\varepsilon\alpha} = 0]$ and $[(M_{ab}\vec{a}d)_{in} = 0]$.

$[(M_{ab}\vec{a}d)_{in} = 0]$ because the decrease in (V) is exactly offset by the increase in $(P = M\vec{a}/A = M\vec{a}/m^2)$.

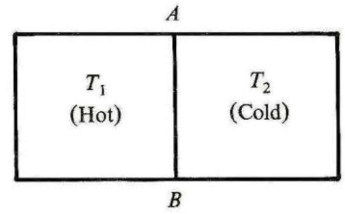
Since $\left[730(kg)(m/s^2)(m)\right]$ of $[(M_{em}\vec{a}d)_{out}]$ was done on the gas during the compression, we have: $\left[\dfrac{(M_{em}\vec{a}d)_{out}}{T} = \dfrac{730(kg)(m/s^2)(m)}{293^o T} = 2.49\dfrac{(kg)(m/s^2)(m)}{T}\right]$

NOTE: Schaum's statement: Notice the entropy change is negative. Disorder of the gas decreased as it was pushed into a smaller volume.

JK: The misuse of dashes (-) and crosses (+) to label something negative and positive is one of the major faults in a logical thinking process. There is no negative or positive heat.

Again, there is no logical reason to continue with the concept of entropy; the concept of order and disorder. Kanarev has shown that all thermodynamics is the absorption and emission of photons by the electrons of atoms and molecules.

3: A container is separated into two equal-volumes. Each side contains $(0.74g)$ of the same gas. At the start, the hot gas is at $(67^o C)$ and the cold gas is at $(20^o C)$. The only heat transfer is between the partition (AB).



?: Find the changes in each section as the hot gas cools from $(67^o C)$ to $(65^o C)$?

- $(H^s_{cV} = 0.178 cal/g \cdot^o C)$
- $T = (M\vec{a}d)_{\text{initial-internal-}\varepsilon\alpha} + (M_{ab}\vec{a}d)_{in} + (M_{em}\vec{a}d)_{out}$

A: $$\begin{bmatrix} ((M_{em}\vec{a}d)_{out})_{hot\ gas} = (M)(H^s_{cV})(\Delta T) = (0.74g)(0.178 cal/g \cdot^o C)(2^o C) \\ = 0.263 cal = 1.10(kg)(m/s^2)(m) \end{bmatrix}$$

Heat lost by hot gas

$$\begin{bmatrix} ((M_{ab}\vec{a}d)_{in})_{cold\ gas} = \frac{((M_{em}\vec{a}d)_{out})_{hot\ gas}}{T_h} = \frac{1.10(kg)(m/s^2)(m)}{(273^o T + 66^o C)} \\ = \frac{1.10(kg)(m/s^2)(m)}{(339^o T)} = 3.24 < 3\frac{(kg)(m/s^2)(m)}{^o T} \end{bmatrix}$$

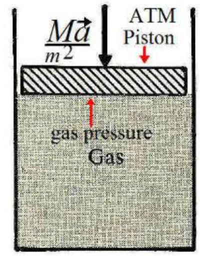
Heat gained by cold gas

$$\begin{bmatrix} ((M_{ab}\vec{a}d)_{in})_{cold\ gas} = \frac{((M_{em}\vec{a}d)_{out})_{hot\ gas}}{T_c} = \frac{1.10(kg)(m/s^2)(m)}{(273^o T + 21^o C)} \\ = \frac{1.10(kg)(m/s^2)(m)}{(294^o T)} = 3.75 < 3\frac{(kg)(m/s^2)(m)}{^o T} \end{bmatrix}$$

The final state of the cold gas after absorption of photons from the hot gas.

NOTE: The concept of entropy is NOT needed.

4: The ideal gas in the cylinder is initially at conditions (P_1, V_1, T_1). It is slowly expanded at constant temperature by allowing the piston to rise. Its final conditions are (P_2, V_2, T_1) where $(V_2 = 3V_1)$.



?: Find the change in the gas during the expansion.

- $(M = 1.5g)$ mass of gas
- $(W = 28)$ molecular weight

A: For an ideal gas expansion at constant temperature:

$$\left[(M\vec{a}d)_{\text{initial-internal-}\varepsilon\alpha} = (P_1)(V_1)\left(\ln \frac{V_2}{V_1} \right) \right]$$

Therefore,

$$\left[\begin{aligned} \frac{(M\vec{a}d)_{\text{initial-internal-}\varepsilon\alpha}}{T} &= (P_1)(V_1)\left(\ln \frac{V_2}{V_1} \right) = \left(\frac{M}{W} \right)(R)\left(\ln \frac{V_2}{V_1} \right) \\ &= \left(\frac{M}{W} \right) \qquad (R) \qquad \left(\ln \frac{V_2}{V_1} \right) \\ &= \left(\frac{1.5 < 3kg}{28\, kg/kmol} \right)(8314 \frac{(kg)(m/s^2)(m)}{kmol \cdot T})(\ln 3) \\ &= \left(0.05357 < 3 \frac{kg}{kg/kmol} \right)(8314 \frac{(kg)(m/s^2)(m)}{kmol \cdot T})(1.0986) \\ &= 0.489 \frac{(kg)(m/s^2)(m)}{T} \end{aligned} \right]$$

NOTE: Again, the concept of entropy is not needed.

5&6: Deals with assigning $\left(\frac{(kg)(m/s^2)(m)}{T} \right)$ to the flipping of coins. This is illogical science.