Calorimetry

① Net heat lost = Net heat gain

$$\boxed{t = \frac{m_1 s_1 t_1 + m_2 s_2 t_2}{m_1 s_1 + m_2 s_2}}$$

③ Specific heat:

$dQ = ms\,dt$

$\boxed{S = \frac{1}{m}\frac{dQ}{d\theta}}$ J/kg K (°C)

cal/gm(°C)

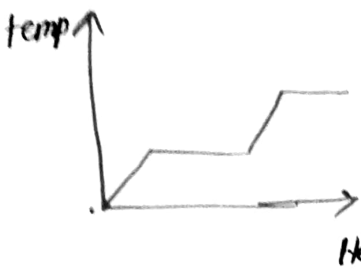
$S_w = 1$ cal/gm°C $= 4200$ J/kg K

$S_{ice} = 0.5$ cal/gm°C

② ~~Specific~~ heat capacity, $dQ = ms\,\Delta t$

$\boxed{H = \frac{dQ}{dt} = ms}$

$\boxed{H = \rho \frac{4}{3}\pi R^3 s}$



④ Latent heat : $\boxed{Q = mL}$

$L_{ice} = 80$ cal/gm $L_{steam} = 540$ cal/gm

change in state → mL

change in temp → $ms\,d\theta$

$-5°C \,(s) \xrightarrow{ms\,d\theta} 0°C \,(s) \xrightarrow{mL} 0°C \,(l) \xrightarrow{ms\,\Delta t} 100°C \,(l) \xrightarrow{mL} 100°C \,(g)$

⑤ Joule's law :

$\boxed{W = JQ}$

$Mgh = J(mL) = J(ms\Delta t) = J(mL + ms\Delta t)$

$\frac{1}{2}mv^2 = J(ms\Delta t)$ → bullet

$\boxed{J = 1}$ (S.I)

$J = 4.2$ cal/g CGS

$\frac{1}{2}mv^2 - \frac{1}{2}mu^2 = J(mL + ms\Delta t)$ → work energy

$\frac{1}{2}I\omega^2 = Jms\Delta t$

Power(P).t $= Jms\Delta t$

$\tau\theta = Jms\Delta t$

→ without greenhouse effect temp of Earth would −18°C due to excess radiation loss.