TEMPERATURA

$\overline{W_n} = n\frac{3}{2}RT$ povpr. translacijska energija

$\overline{W_n} = n\frac{5}{2}RT$ za dvoatomno molekulo

$\overline{W_n} = 3RT$ za večatomno molekulo

$\bar{v} = \sqrt{\frac{2\overline{W}}{\mu}}$ povprečna hitrost molekul

$v_0 = \sqrt{\frac{2k_bT}{\mu}}$ najverjetnejša hitrost molekul

$\Phi = \bar{v}N'S$ pretok molekul (N' = N/V)

$\mu = Mu$ masa molekule

$W_n = mcT$ notranja energija ($c = \frac{3k}{2Mu}$)

$da = a\alpha dT$ raztezek v željeni dimenziji

$\Delta l = \alpha l \Delta T$ linearni raztezek

$\Delta V = \beta V \Delta T$ prostorninski razt. ($\beta=3\alpha$)

$\Delta V = V\chi p$ χ - stisljivost snovi

$p = E\frac{\Delta l}{l}$ tlak (E je prožnostni modul)

$p = \frac{nR}{V}T$ tlak, če je V stalen (posoda)

$dp = E\alpha dT$ če ni prostora za raztezek

$dp = \frac{\beta}{\chi}dT$ tlak pri kapljevinah

$A = -p\Delta V$ delo tlaka

$c_p = c_v + \frac{p\Delta V}{m\Delta T} = c_v + \frac{R}{M}$

$C = mc_p$ toplotna kapaciteta

$R = \frac{d}{\lambda S}$ toplotni upor

$P = \frac{Q}{t} = \frac{\Delta T}{R}$ toplotni tok

$P = \lambda S\frac{\Delta T}{d}$ prevajanje toplote(λ prevodnost)

$j = \frac{P}{S} = -\lambda\frac{\Delta T}{\Delta d}$ gostota toplotnega toka

$j = \alpha(T_s - T_z)$ med steno in zrakom

$\frac{\Delta T}{d}$ gradient temperature

$j = a \cdot j_0$

$\lambda = \frac{k_w}{T}$ k_w=2,9E-03 Km

$j = \sigma \cdot T^4$

σ=5,67E-08 W/m^{2}K^4

Plinski zakoni:

$pV = Nk_b$ enačba stanja (N št. Molekul)

k_b=1,38×10^{-23} J/K boltzmanova konst.

$\frac{p}{\rho} = \frac{R}{Mkg}T$ enačba stanja (ko rabimo ρ)

$\frac{p_0V_0}{T_0} = \frac{p_1V_1}{T_1}$ $\frac{p_0}{\rho_0T_0} = \frac{p_1}{\rho_1T_1}$

$\frac{p_0}{T_0} = \frac{p_1}{T_1}$ volumen stalen

$\frac{V_0}{T_0} = \frac{V_1}{T_1}$ tlak stalen

$p_0V_0 = p_1V_1$ temperatura stalna

TOPLOTA

$p_v = \rho_v\frac{RT}{Mkg}$ absolutna vlažnost zraka

$\eta = \frac{p_v}{p_n}$ relativna vlažnost (p_n – nasičen)

$Q_i = mq_i$ izparilna toplota

$Q_i = mq_t$ talilna toplota

$Q_s = mq_s$ sublimacijska toplota

$B = \mu B_0$ μ - permeabilnost snovi

Energija

$W_k = \frac{mv^2}{2}$

$W_p = mgh$

$W_{pr} = \frac{kx^2}{2}$

Delo in moč

$A = Fs\cos\varphi$

$P = \frac{A}{t}$

P=Fv

A=Pt

ELEKTRIČNO POLJE

F=e E

U=E d

e=CU

U=ΔV V el.potencial

A= F_e s

A=Ee(h_2-h_1)

A=e(V_2-V_1)

V=Eh

$w = \frac{\varepsilon_0E^2}{2}$ gostota el. polja

$w = \frac{W}{e}$

F=eE

$F = \frac{e_1e_2}{4\pi\varepsilon_0r^2}$ električna sila

$E = \frac{F}{e} = \frac{e}{4\pi\varepsilon_0r^2}$ jakost električnega polja okoli točke

$E = \frac{\sigma}{\varepsilon_0}$ v homogenem el. polju 2 plošči

$E = \frac{\sigma}{2\varepsilon_0}$ v okolici 1 ravne plošče

$\sigma = \frac{e}{S}$ ploskovna gostota naboja

$E = \frac{E_0}{\varepsilon}$ oslabljeno polje v snovi

A = eEh = eU v homogenem el. polju

$C = \frac{e}{U} = \varepsilon\varepsilon_0\frac{S}{d}$ kapaciteta kondenzatorja

$W_e = \frac{e_1e_2}{4\pi\varepsilon_0r}$ električna potenc. energija

$W_e = \frac{CU^2}{2} = \frac{1}{2}\frac{e^2}{C}$

$a = \frac{eE}{m}$ pospešek el. delca

$F = 6\pi\beta rv$ β viskoznost zraka

Valjast kondenzator

$U = -\frac{e}{\varepsilon_0 2\pi l}\ln\frac{b}{a} = \frac{e}{C}$

$E = \frac{e}{\varepsilon\varepsilon_0 2\pi rl}$

$dC = 2\pi\frac{\delta}{\ln\frac{b}{a}}(\varepsilon - 1)dx$

$\delta = SE$

$\Phi_e = \varepsilon_0SE\cos\varphi = \vec{D}\times\vec{S}$

$\Phi_e = \oint\vec{D}\cdot d\vec{S} = e$

$U(b,a) = -\int_a^b\vec{E}d\vec{s}$

$E = \frac{e}{\varepsilon_0S}$

$U(b,a) = \frac{e}{\varepsilon_0S}d$

$E_{sk} = E_z - E_n = \frac{E_z}{\varepsilon}$ izolator v C

ELEKTRIČNI TOK

e=I t

$R_n = \frac{U_g - U}{I}$

U = RI

I=n e_0

e_0=1,6*10^{-19} As

$1\,\Omega\frac{mm^2}{m} = 10^{-6}\,\Omega m$

$\frac{\Delta R}{R} = \alpha\Delta T$

$R = \xi\frac{l}{S}$ ξ - električna upornost

$R = \frac{U_v R_v}{I_A R_v - U_v}$ V vzp. na R; A zap. na oba

$R = \frac{U_v}{A_A} - R_A$ V vzporedno na R in A

$R = R_v(\frac{U}{U_0} - 1)$ predupornik za voltmeter

$R = R_A \frac{I_0}{I - I_0}$ predupornik za ampermeter

Vzporedna vezava

$R = \frac{R_1 R_2}{R_1 + R_2}$, $I = I_1 + I_2 + I_3$, $U_1 = U_2 = U_3$

$\frac{I_1}{I_2} = \frac{R_2}{R_1}$

$C = \sum C_i$

Zaporedna vezava

$U = U_1 + U_2$ $R = R_1 + R_2$

$\frac{U_1}{U_2} = \frac{R_1}{R_2}$

$\frac{1}{C} = \sum \frac{1}{C_i}$

$I = jS$

$A = UI\Delta t$ električno delo

$P = UI = RI^2 = \frac{U^2}{R}$ elekrtična moč

$Q = P\Delta t = I^2 R\Delta t$ Joulova toplota

$\Delta T = \frac{\xi \Delta t}{\rho c}(\frac{I}{S})^2$ temperatura žičke

$j = \frac{I}{S}$ gostota el. Toka

Polnjenje/praznjenje kondenzatorja.

$$I = I_0 e^{-\left(\frac{t}{\tau}\right)}$$

$$U_r = U_0 e^{-\left(\frac{t}{\tau}\right)}$$

$$U_c = U_0 - U_r = U_0\left(1 - e^{-\left(\frac{t}{\tau}\right)}\right)$$

ENTROPIJA IN TOPLOTNI STROJI

$$P = \frac{Q}{t} = \frac{dQ(t)}{dt}$$

$$P = -\lambda S \frac{\Delta T}{\Delta x}$$

$$j = \frac{P}{S} = -\lambda \frac{\Delta T}{\Delta x}$$

$$\eta = \frac{|A_{ODV}|}{Q_{DOV}} = 1 - \frac{|Q_{ODV}|}{Q_{DOV}}$$

$$\eta_{Carnotovi\check{S}} = 1 - \frac{T_{NIZ}}{T_{VIS}}$$

$U = K \cdot \Delta T \quad K = 41\mu V/K$

$\frac{V_{voda}}{V_{led}} = \frac{\rho_{led}}{\rho_{voda}}$

$\Delta S_{KS} = \oint \frac{dQ}{T} = 0$

$\Delta S_{rev} = S_2 - S_1 = \int_1^2 \frac{dQ}{T}$

$\Delta S_{HIRN} = \frac{m \cdot R}{M} \cdot \ln \frac{V}{V_0}$

$\Delta S \geq \int_1^2 \frac{dQ}{T}$

$(\Delta S)_V = mc_v \ln \frac{T_2}{T_1}$

$(\Delta S)_p = mc_p \ln \frac{T_2}{T_1}$

$(\Delta S)_Q = 0$

$(\Delta S)_T = \frac{p_1 V_1}{T} \cdot \ln \frac{V_2}{V_1}$

$dQ_t = q_t \cdot dm$

$dQ_l = q_l \cdot dm$

$dW_n = dQ + dA = dQ - pdV$

$dQ = dW_n + pdV$

$dp_{vrel} = \frac{m \cdot q_l}{(V_{para} - V_{tek})} \cdot \frac{dT}{T} \Rightarrow \frac{dp}{p}\frac{RT}{M} = q_l \cdot \frac{dT}{T}$

$dp_{tal} = \frac{m \cdot q_t}{(V_{tek} - V_{trd})} \cdot \frac{dT}{T}$

$\varepsilon_0 = 8{,}9 * 10^{-12}$ As/Vm

	izobarna	izotermna	izohorna	adeabatna
A	$-p\Delta V$	$-nRT\ln(V/V_z)$	0	$mc_v\Delta T$
Q	$mc_p\Delta T$	-A	$mc_v\Delta T$	0
ΔW_n		0	$mc_v\Delta T$	$mc_v\Delta T$
konst	V/T	PV	P/T	PV^κ
ΔS	$mc_p\ln(T/T')$	Q/T	$mc_v n(T/T')$	0