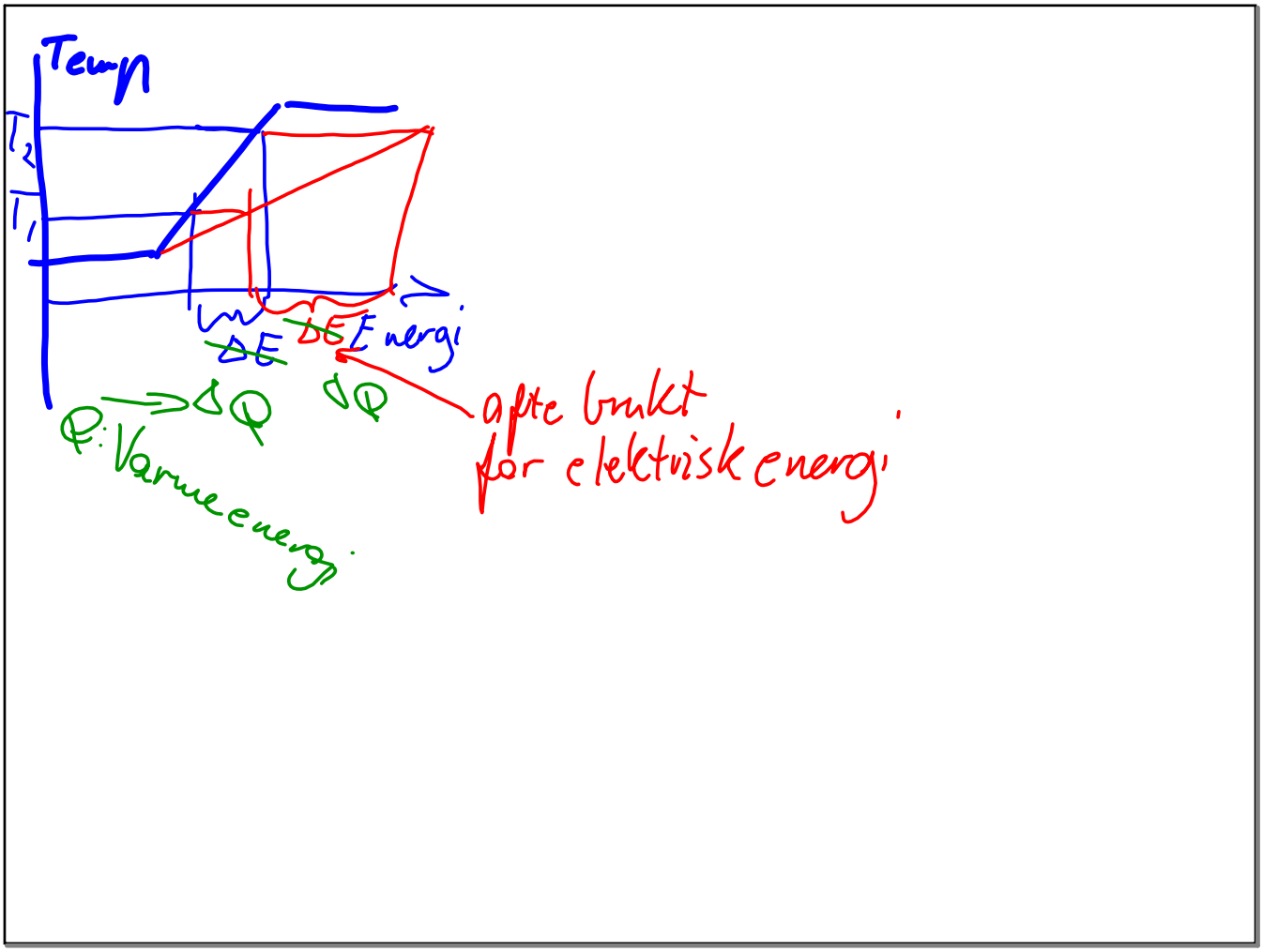

Temp
T_2
T_1
ΔE
ΔE Energi
ΔQ
ΔQ
Q: Varmeenergi
ofte brukt
for elektrisk energi

7.11

b)

Skal finne den spesifikke varmekapasiteten: c

Væske $m = 480\,g$

Q_T ← Tilført varme

Da øker temperaturen fra 16,5°C til 31,2°C

Den varmen som blir tilført: $Q_T = P \cdot t = 150 \cdot 100\,[W \cdot s]$

$= 15000\,[J]$

150 W, 100 s

Spes. varmekapasitet, masse, temp.økning

$Q = c \cdot m \cdot \Delta T$

$\Delta T = 31{,}2 - 16{,}5 = 14{,}7\,[K]$

°C °C °C

K | °C

$273 + 31{,}2$ | $31{,}2$

$273 + 16{,}5$ | $16{,}5$

$273 + 31{,}2 - 273 - 16{,}5$

$31{,}2 - 16{,}5 = 14{,}7\,K$

$31{,}2 - 16{,}5 = 14{,}7\,°C$

$$c = \frac{Q}{m \cdot \Delta T} = \frac{15{,}0\,[kJ]}{0{,}480\,[kg] \cdot 14{,}7\,[K]}$$

$$= 2{,}13\left[\frac{kJ}{kg \cdot K}\right]$$

c) Benzen: $c_b = 1{,}74\left[\frac{kJ}{kg \cdot K}\right]$

$Q_T = Q_B + Q_{tap}$

Q_B: Varme opp Benzen

$$Q_{tap} = Q_T - Q_B = 15{,}0\,[kJ] - c_b \cdot m \cdot \Delta T = 15\,[kJ] - 1{,}74 \cdot 0{,}48 \cdot 14{,}7\left[\frac{kJ}{kg \cdot K} \cdot kg \cdot K\right]$$

$$= 15{,}0\,[kJ] - 12{,}3\,[kJ] = 2{,}7\,[kJ]$$

7.12

$c_V = 4{,}2 \left[\frac{kJ}{kg \cdot K}\right]$ $c_A = 0{,}9 \left[\frac{kJ}{kg \cdot K}\right]$

$\Delta T = 98 - 8 = 90[K]$

$m_V = 4{,}0[kg]$ $m_A = 0{,}60[kg]$

$Q_T = P \cdot t$

$P = 1{,}00[kW]$

$t = ?$

$$Q_T = Q_A + Q_V = c_A \cdot m_A \cdot \Delta T + c_V \cdot m_V \cdot \Delta T =$$

$$0{,}9\left[\frac{kJ}{kg \cdot K}\right] \cdot 0{,}60[kg] \cdot 90[K] + 4{,}2\left[\frac{kJ}{kg \cdot K}\right] \cdot 4{,}0[kg] \cdot 90[K] =$$

$$48{,}6[kJ] + 1512{,}0[kJ] = 1560{,}6[kJ]$$

$$t = \frac{Q_T}{P} = \frac{1560{,}6\ [kJ]}{1{,}0\ [kW]} = 1560{,}6\left[\frac{J}{W}\right] = 1560{,}6[s]$$

$$\frac{1560{,}6\ s}{60\ s/min} = 26\ min$$

7.14

$v = 100\left[\frac{km}{t}\right]$ $\quad E_K = \frac{1}{2}mv^2$ $\quad c_J = 0{,}45\frac{kJ}{kg\cdot K}$

$\downarrow$

$v = 100\cdot\frac{1000\,m}{3600\,s} = \frac{100}{3{,}6}\left[\frac{m}{s}\right]$

$E_k = Q = c_J\cdot m\cdot\Delta T = \frac{1}{2}mv^2$ (2)

$c_J\cdot\Delta T = \frac{1}{2}v^2$

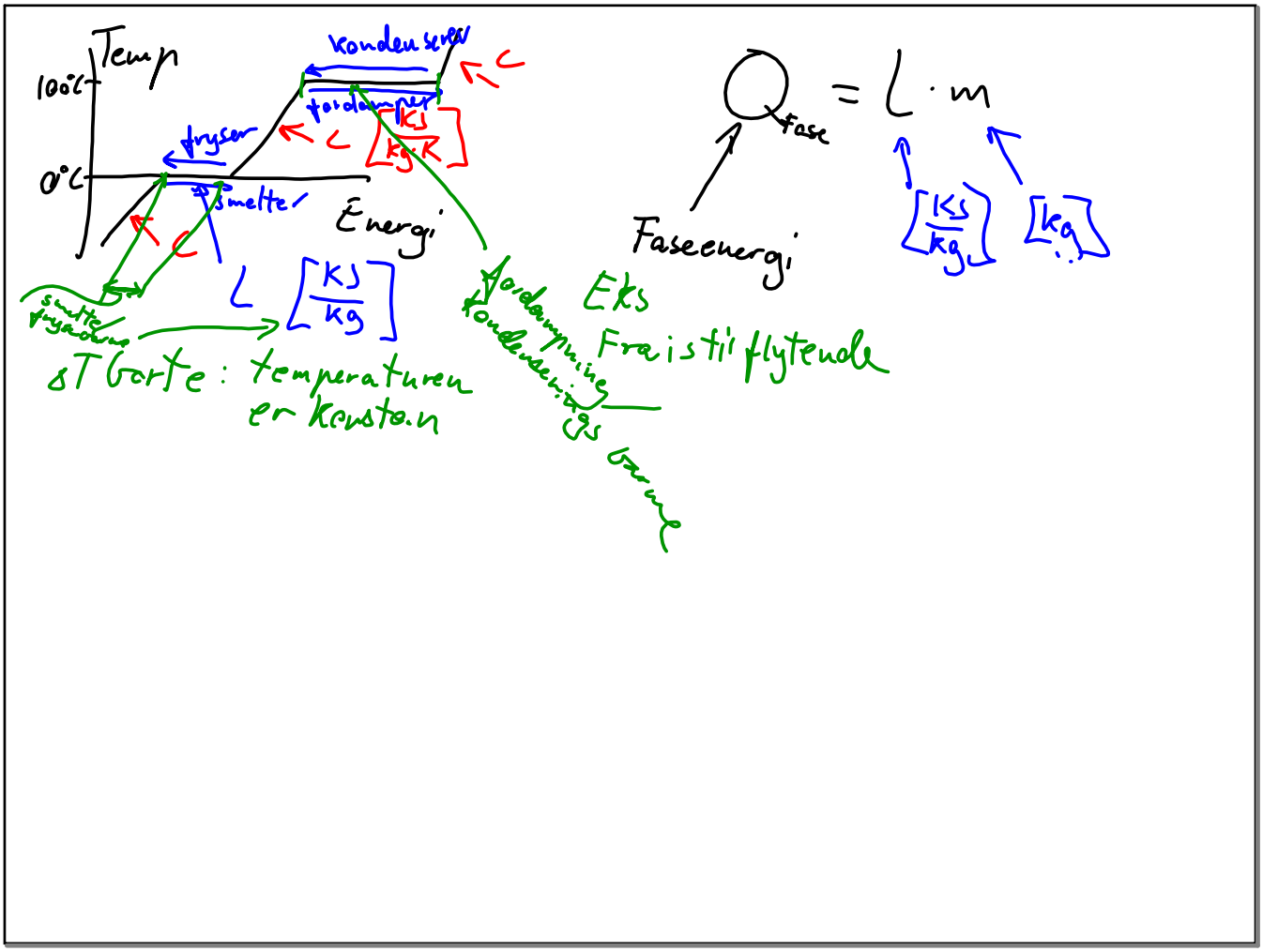
$\Delta T = \frac{1}{2}\cdot\frac{v^2}{c_J} = \frac{1}{2}\left(\frac{100}{3{,}6}\right)^2\cdot\frac{1}{0{,}45\left[\frac{kJ}{kg\cdot K}\right]}\left[\frac{m^2}{s^2}\right] = \frac{771{,}6}{2\cdot 0{,}45}\left[K\cdot\frac{1}{K}\right] = \frac{771{,}6\cdot 10^{-3}}{2\cdot 0{,}45}[K]$

$= 0{,}85[K]$

kile Kelvin

$K\cdot N\cdot m = t\cdot kg\cdot\frac{m^2}{s^2}$

$kg\cdot\frac{m}{s^2}$ t K $1/0$


Temp
100°C
0°C
Energi
kondenserer
fordamper
fryser
smelter
$\frac{kJ}{kg \cdot K}$
$Q_{fase} = L \cdot m$
Faseenergi
$\frac{kJ}{kg}$
kg
L $\left[\frac{kJ}{kg}\right]$
Eks
Fra is til flytende
sT forte: temperaturen
er konstant