* $\frac{P_1V_1}{T_1} =$
$\frac{P_2V_2}{T_2} =$
$nR =$
P_1, V_1
T_1
P_2, V_2
T_2
m^3
K
Pa
V_1, V_2
L
V_i
A
x_i
x_f
$V_i =$
Ax_i
$V_f =$
Ax_f
$P_o :$
x
x_f
•
x_i
•
P_0
P_0
V_i
V_i
V_f
V_f
•
A
B
•
P
P_o
V
V_i
V_f
V
$(P - V)$
(Isobaric Process)
$:$
$\times \Delta x =$
$F\,(x_f - x_i)$
$:$
$P_o =$
$\frac{F}{A} F =$
$P_o A$
$:$
$W =$
$P_o A\,(x_f - x_i) =$
$P_o\,(Ax_f - Ax_i)$
$:$
$W =$
$P_o\,(V_f - V_i) =$
$P_o \Delta V$
$:$
$W =$
$P_o \Delta V$
$\frac{P_1V_1}{T_1} =$
$\frac{P_2V_2}{T_2}$
$P_1 =$
$P_2 =$
$P_o =$
[1] $T_1 = \frac{V_2}{T_2} = : V_2 = \left(\frac{V_1}{T_1}\right) T_2 y = ax$
$(P - V)$
$W =$
$P \Delta V =$
$P\,(V_f - V_i) =$
A
$(P - V)$
P
ΔV
$(P - V)\,,\ (P - T)$
$(V - T)$
P
P_o
V
V_i
V_f
V
•
A
B
•
$W =$
$P\,(V_f - V_i)$
$(P - V)$

$\frac{2P_1-P1+P2}{2}\Delta V$
$\Delta V+$
$\frac{P_2-P_1}{2}\Delta V$
$\therefore W=$
$P_1\Delta V+$
$\frac{1}{2}(P_2-P_1)\Delta V$
$(P-V)$
P
P_1
P_2
V
V_1
V_2
V
- A
B
C
- $W_1=$
A_{ABC}
$W_2=$
$A_{BCV_2V_1}$
$(P-V)$
$(P-V)$
$(P-V)$
$A=$
$A_{ABC}+$
$A_{BCV_2V_1}$
$ABC=$
$\frac{1}{2}(P_2-P_1)(V_2-V_1)$ $A_{BCV_2V_1}=$
$P_1\Delta V$
$\therefore A=$
$P_1\Delta V+$
$\frac{1}{2}(P_2-P_1)(V_2-V_1)$
$\therefore A=$
$W=$
$P_1\Delta V+$
$\frac{1}{2}(P_2-P_1)\Delta V$
$(P-V)$
$(P-V)$
O
P
P_f
P_i
V
V_i
V_f
- A
B
- $(P-V)$
(Isothermal Process):
$\int_{V_i}^{V_f} pdV=$
$Nk_BT\int_{V_i}^{V_f}\frac{dV}{V}$
$\therefore W=$
$Nk_BT\ln[V]_{V_i}^{V_f}$
$\therefore W=$
$Nk_BT\ln\left(\frac{V_f}{V_i}\right)=$
$nRT\left(\frac{V_f}{V_i}\right)$
$\therefore W=$
$nRT\left(\frac{V_f}{V_i}\right)$
$\frac{P_1V_1}{T_1}=$
$\frac{P_2V_2}{T_2}$
$T_1=$
$T_2=$
$V_1=$
$P_2T_2=$
$\therefore P_2=$
$\frac{P_1V_1}{V_2}$ $y=$
$\frac{a}{x}$
$\ln\left(\frac{V_f}{V_i}\right)$ $W=$
$Nk_BT\ln\left(\frac{V_f}{V_i}\right)$
$\therefore \frac{V_f}{V_i}=$
P_i

P_i
Q
P_f
P
P_f
P_i
V
$V_i =$
V_f
V
•
A
B
•
$(P-V)$
(Iso-
choric
Pro-
cess):
$_i =$
$V_f =$
$\therefore$
$W =$
0
$\frac{P_1V_1}{T_1} =$
$\frac{P_2V_2}{T_2}$
$V_1 =$
$V_2 =$
$1 \; \overline{T_1 = \frac{P_2}{T_2} =: P_2 = \frac{P_1}{T_1} T_2 y = ax}$
$(P-V)$, $(T-V)$
$(P-T)$
P
P_f
P_i
V
$V_i =$
V_f
V
•
A
B
•
$(P-V)$
T
T_f
T_i
V
$V_i =$
V_f
V
•
A
B
•
$(T-V)$
P
P_i
P_f
T
T_i
T_f
•
A
B
•
$(P-T)$