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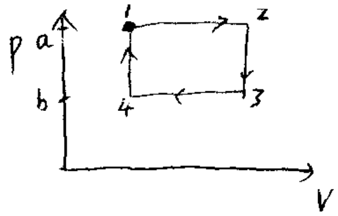
Course 565/665 Lecturer Prof. Cavagnero
Day 3 . 02 . 04 Date 9:55 am
Notes Taken By J. Hong Total Number of Pages

Thermodynamic cycles:



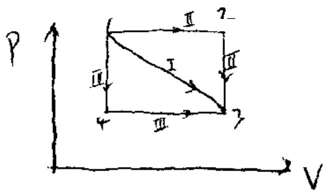
$\oint dV = 0$ and true for any state function.

Ⓔⓧ ① for "p"

$$\oint dp = \Delta p_{21} + \Delta p_{32} + \Delta p_{43} + \Delta p_{14}$$
$$= (p_a - p_a) + (p_b - p_a) + (p_b - p_b) + (p_a - p_b) = 0$$

② Take work across this cycle
can show $\oint dw \neq 0$

Path dependence.



changes in state functions from an initial state to any final state are not dependent on path.

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② changes are path-dependent for non-state functions
(e.g. w. q)

<u>state fns.</u>

① changes across a complete thermodynamic cycle sum up to zero.

② changes from initial to final state are path independent.

③ {Total} differential of a state fn. is an "exact diff."
need?

<u>Quasi-static processes</u>:

processes that proceed by infinitesimal changes.
(small eq. steps).

work done by/on systems is maximized. ?

(losses such as friction are minimized)
"heat"

Ideal Gases

— dilute

— no intermolecular interactions

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$pV = nRT$ ↘ # of mole. $pV = NkT$ ↓ # of molecules.

low p regime: approximately IG.

high p " : e.g. VWG

work for ideal gas: $\delta w = -p_{ext}\, dV$

V const: $dV = 0$, $\therefore \delta w = 0$

p const: $\delta w = -p\, dV$, $w = -p \int_{V_1}^{V_2} dV = -p \Delta V$

T const: $\delta w = -p\, dV = -\frac{nRT}{V} dV$

$w = -nRT \int_{V_1}^{V_2} \frac{1}{V} dV = -nRT \ln \frac{V_2}{V_1}$

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