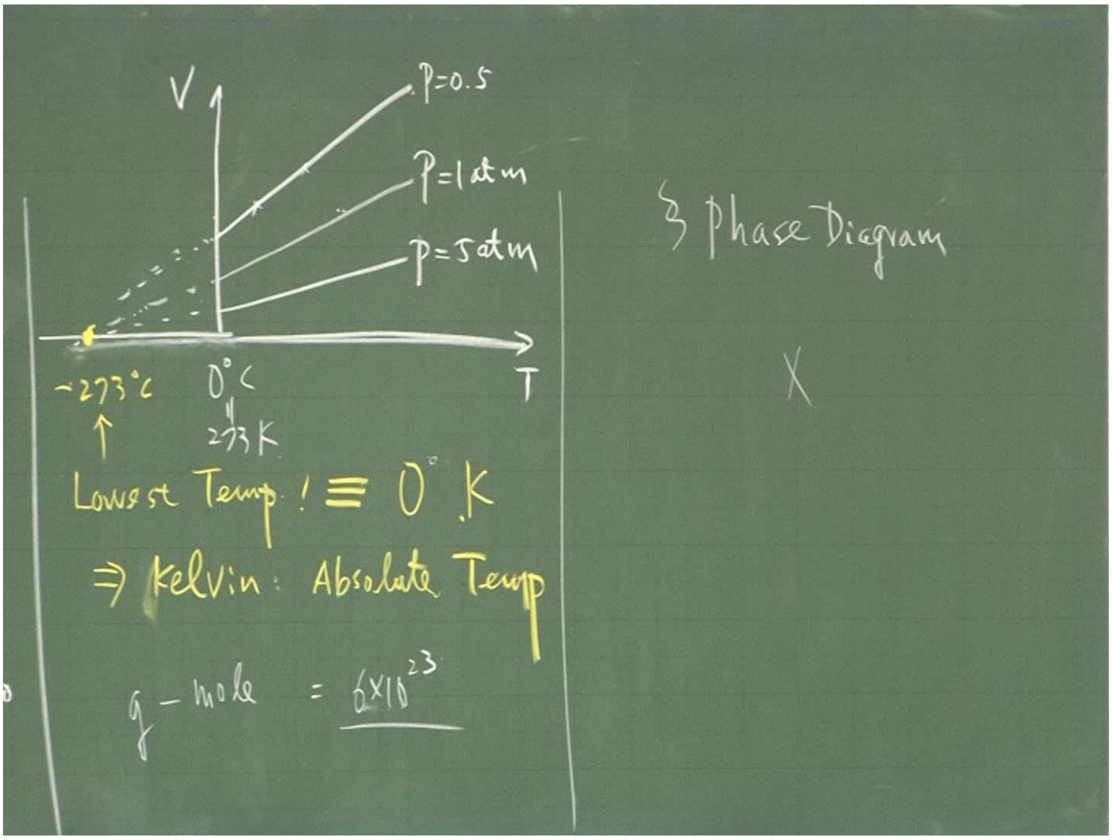
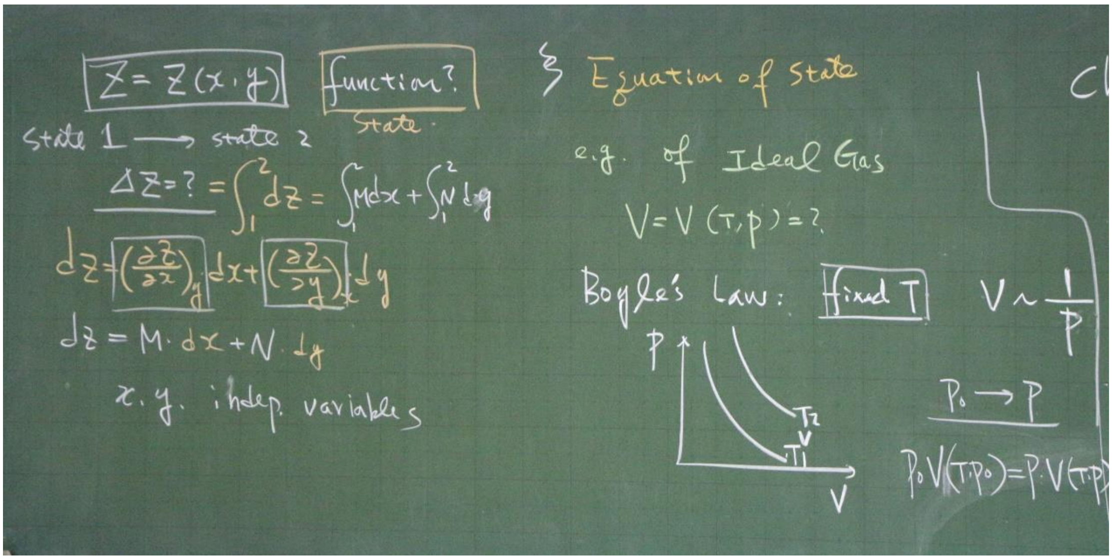
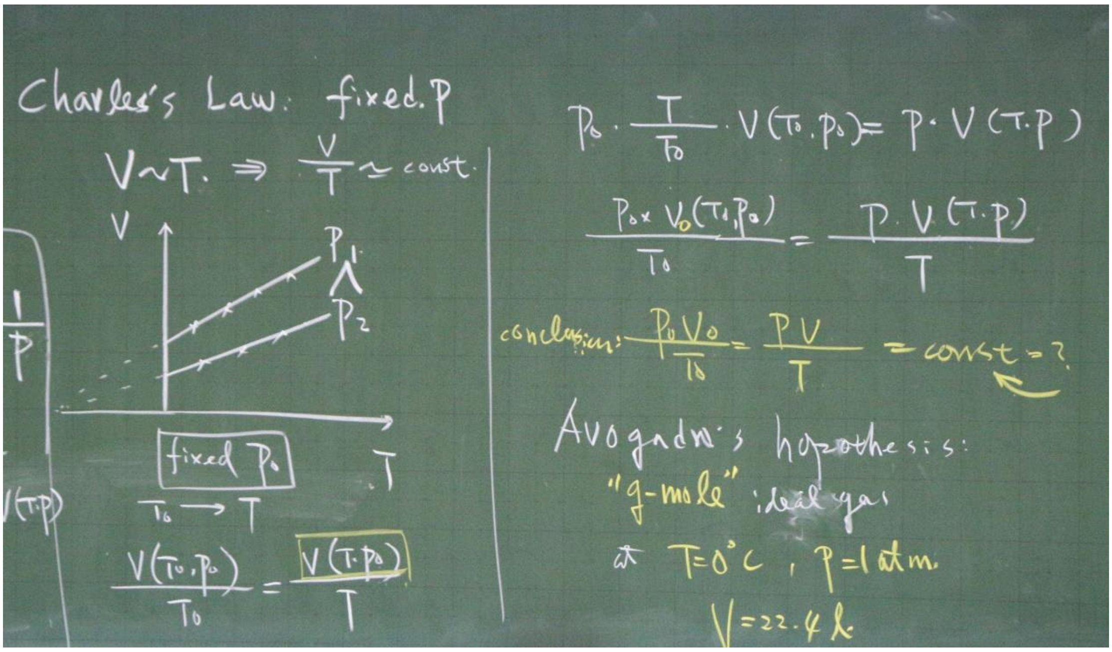
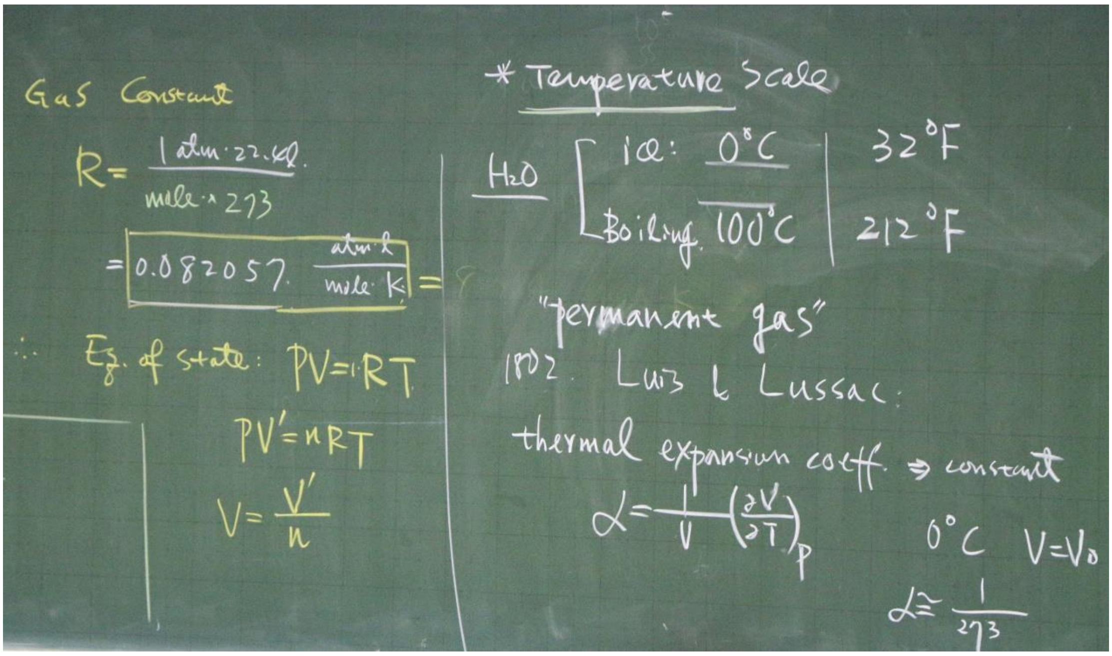
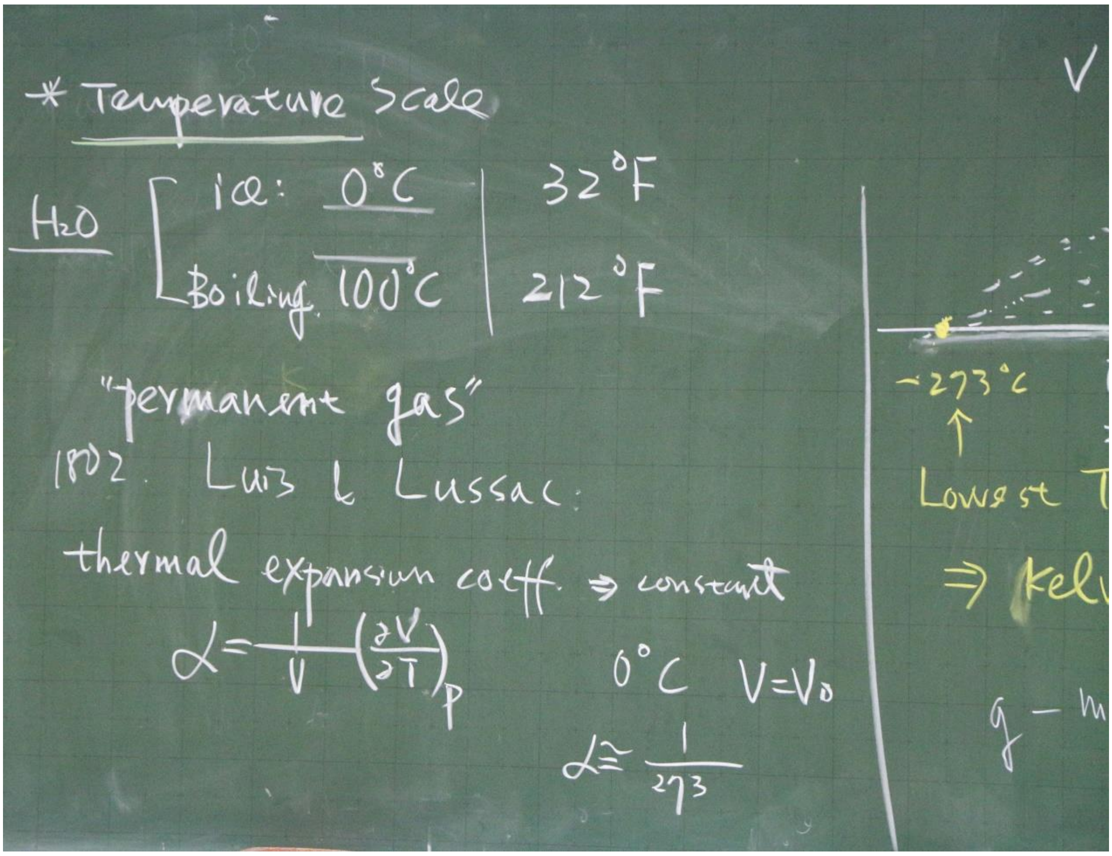

V
P=0.5
P=1 atm
P=5 atm
T
-273°C
0°C
273 K
Lowest Temp.! ≡ 0°K
⇒ Kelvin: Absolute Temp
g-mole = 6×10^23
§ Phase Diagram
X


Z = Z(x,y)
function? State
State 1 ⟶ state 2
ΔZ = ? = ∫₁² dZ = ∫₁² M dx + ∫₁² N dy
dZ = (∂Z/∂x)_y dx + (∂Z/∂y)_x dy
dZ = M·dx + N·dy
x, y. indep. variables
§ Equation of State
e.g. of Ideal Gas
V = V(T,p) = ?
Boyle's Law: fixed T   V ~ 1/P
P
V
T2
T1
P0 ⟶ P
P0·V(T·P0) = P·V(T·P)


Charles's Law: fixed. P
V~T. ⇒ V/T ≃ const.
P1
P2
fixed P0
T0 → T
V(T0.P0)/T0 = V(T.P0)/T
P0 · T/T0 · V(T0.P0) = P · V(T.P)
P0 × V0(T0.P0)/T0 = P.V(T.P)/T
conclusion: P0V0/T0 = PV/T = const = ?
Avogadro's hypothesis:
"g-mole" ideal gas
at T=0°C, P=1 atm.
V=22.4 l.


Gas Constant
R = 1 atm · 22.4 l / mole · 273
= 0.082057 atm·l / mole·K
∴ Eq. of state: PV=1RT
PV′=nRT
V=V′/n
* Temperature Scale
H2O
ice: 0°C | 32°F
Boiling. 100°C | 212°F
"permanent gas"
1802. Luis & Lussac.
thermal expansion coeff. ⇒ constant
α = 1/V (∂V/∂T)P
0°C V=V0
α ≃ 1/273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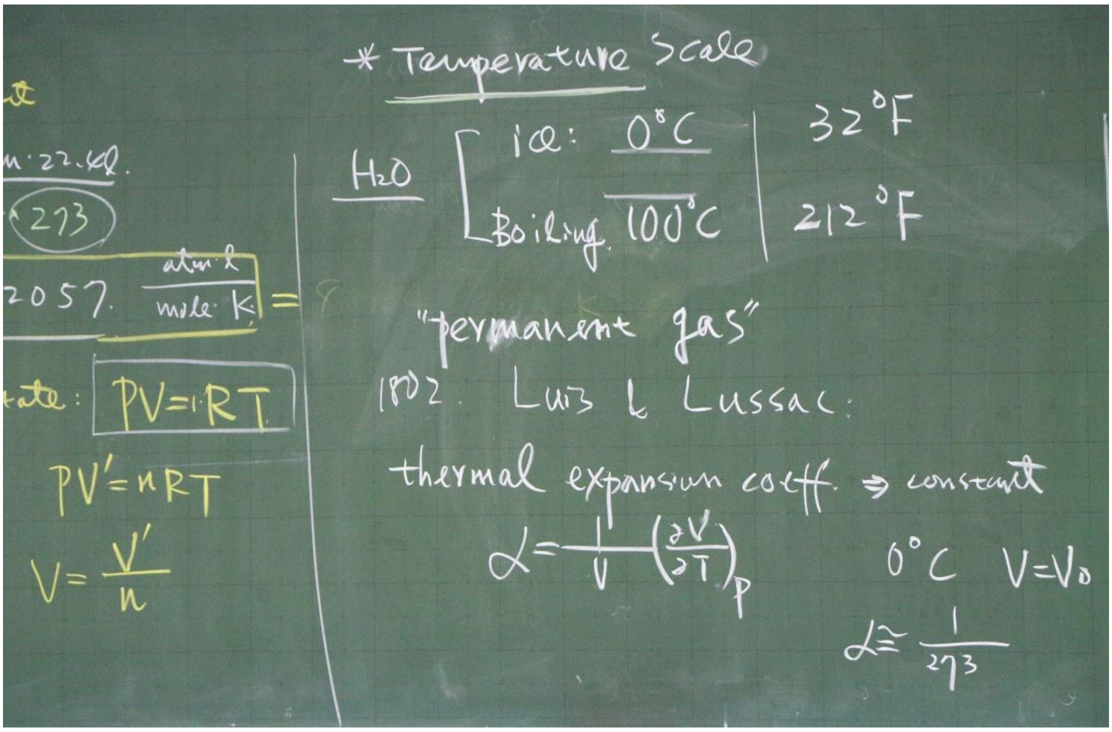
thermal expansion coeff. ⇒ constant
α = 1/V (∂V/∂T)p
0°C V=V0
α ≅ 1/273
−273°C
Lowest


273
atm·l / mole·K
PV=1·RT
PV′=nRT
V = V′/n
* Temperature Scale
H2O
ice: 0°C | 32°F
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α = 1/V (∂V/∂T)p
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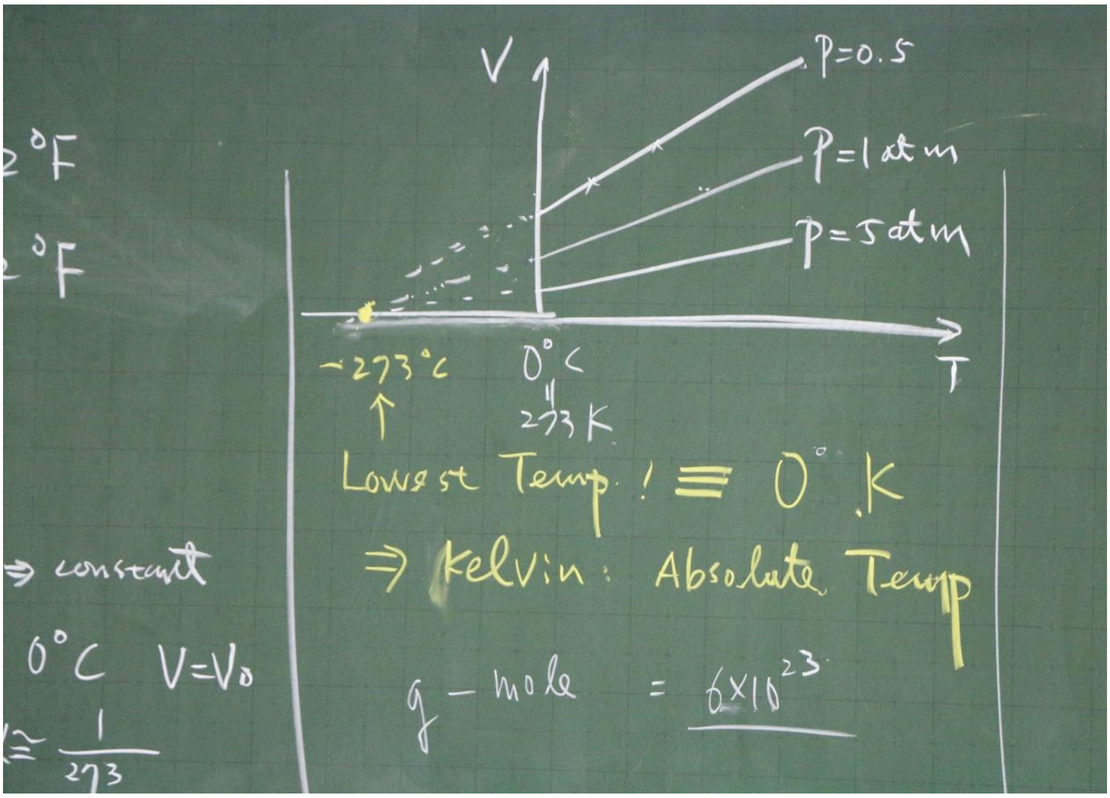
α ≅ 1/273



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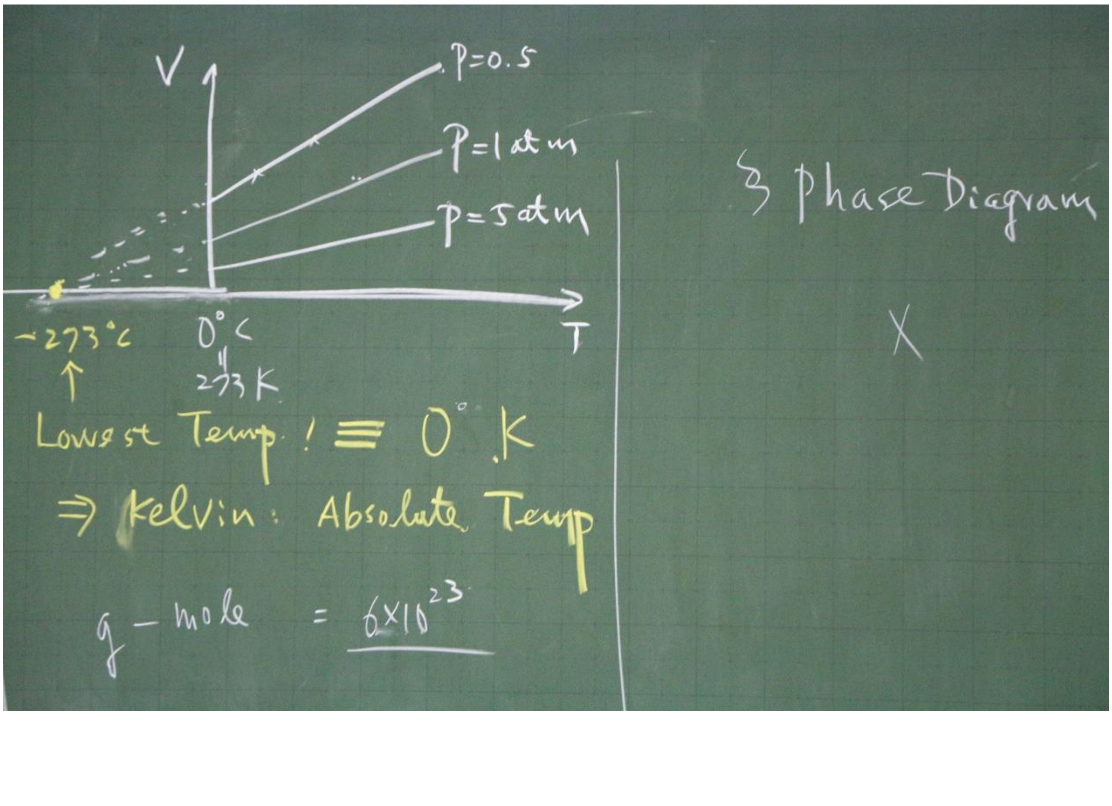
273 K
Lowest Temp. ! ≡ 0° K
⇒ Kelvin : Absolute Temp
g-mole = 6×10^23
⇒ constant
0°C V=V0
1/273

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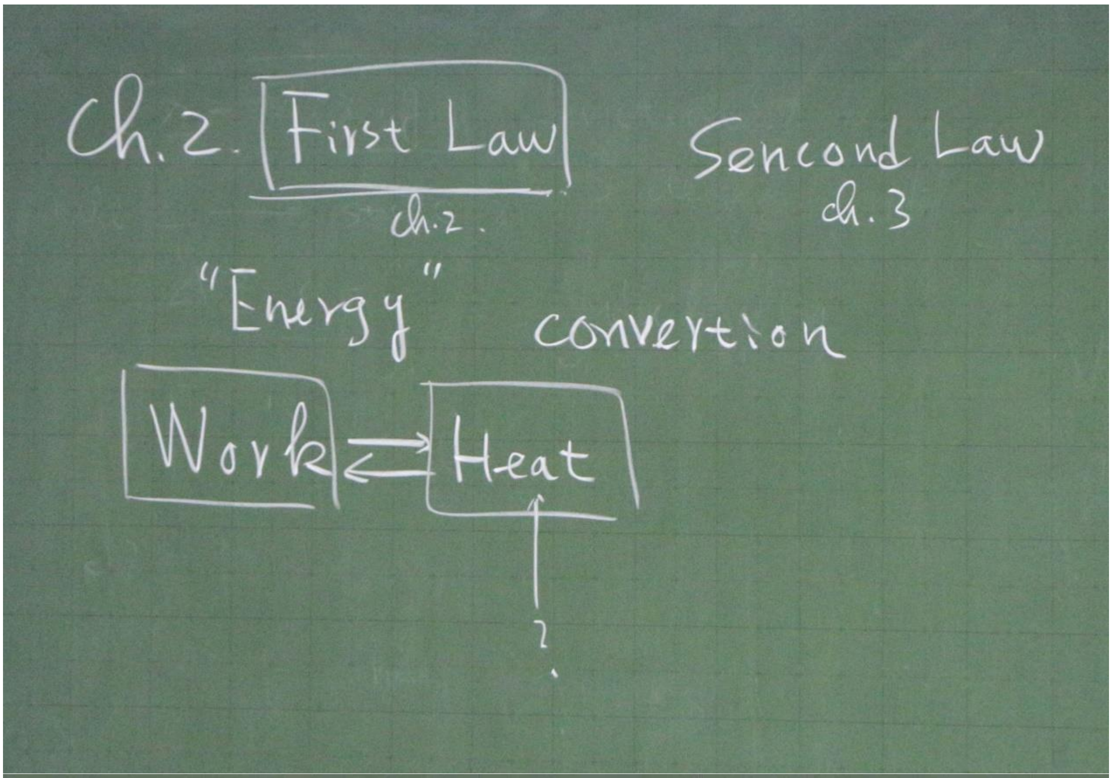
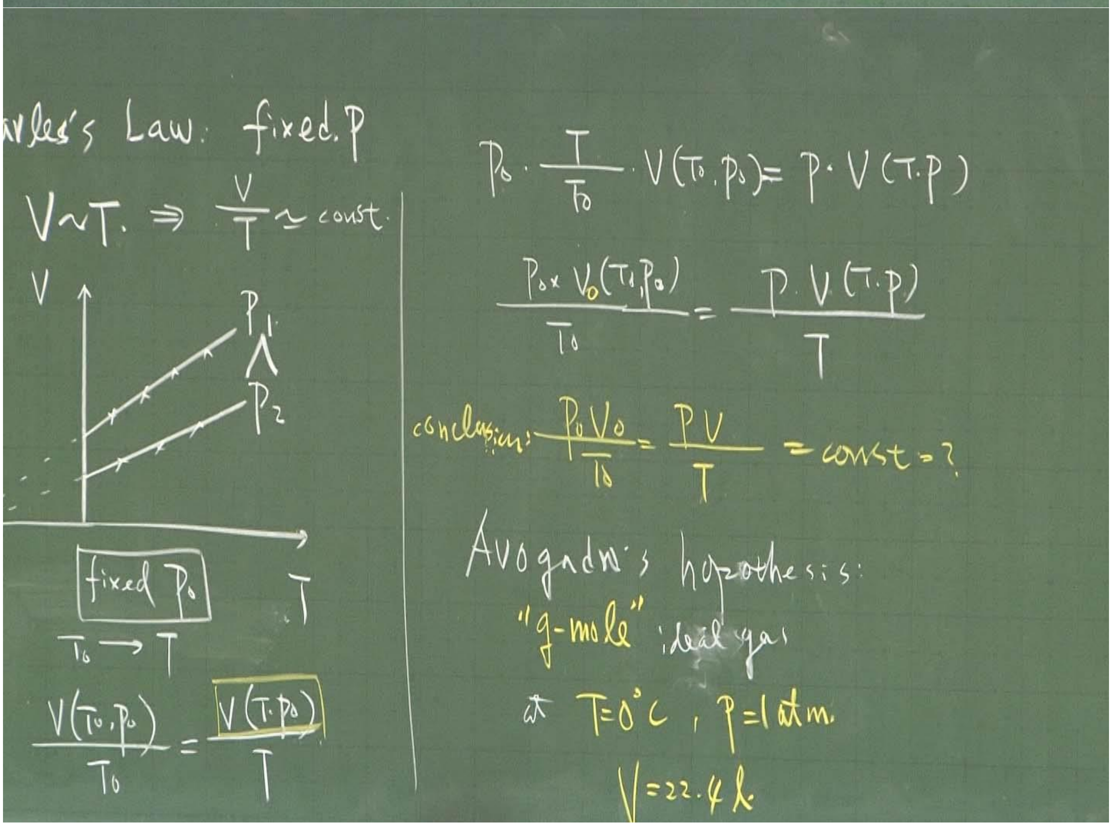

Ch. 2. First Law
ch. 2.
Sencond Law
ch. 3
"Energy" convertion
Work
Heat
?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P2
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