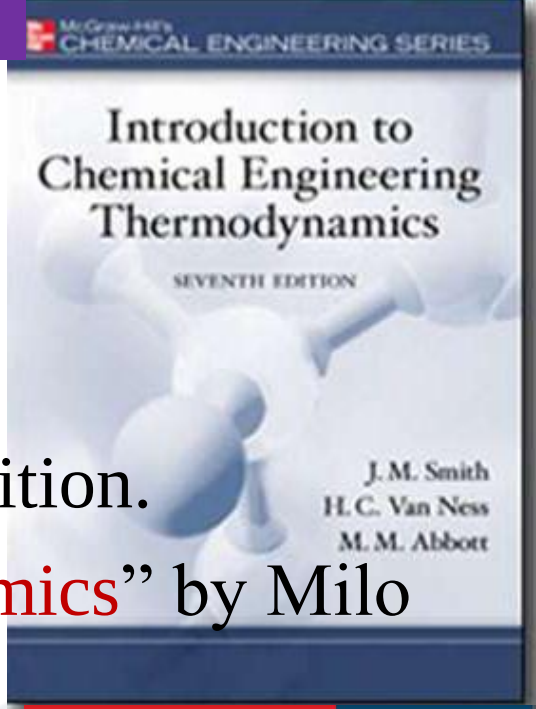
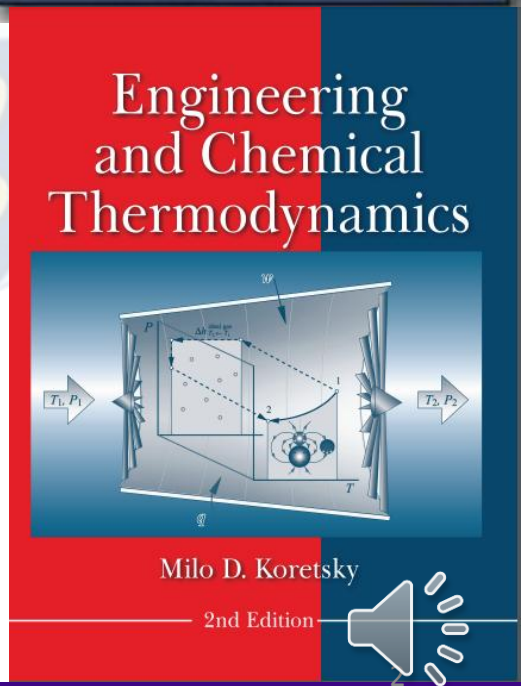
Recommended Books

- "Introduction to Chemical Engineering Thermodynamics" by J.M Smith, 7th Edition.
- "Engineering & Chemical Thermodynamics" by Milo D Koretsky, 2nd Edition.
- "Thermodynamics, an Engineering Approch" by Yunus A Cengel. 7th Edition.





Lecture Outlines

- ✓Zeroth law of Thermodynamics.
- ✓Concept of Work.
- ✓Concept of Internal Energy.
- ✓Concept of Heat.

Temperature Scales

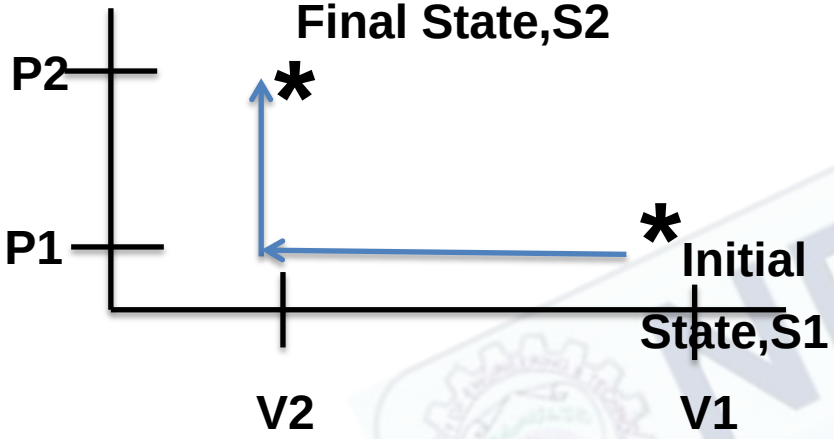
Refrence Point

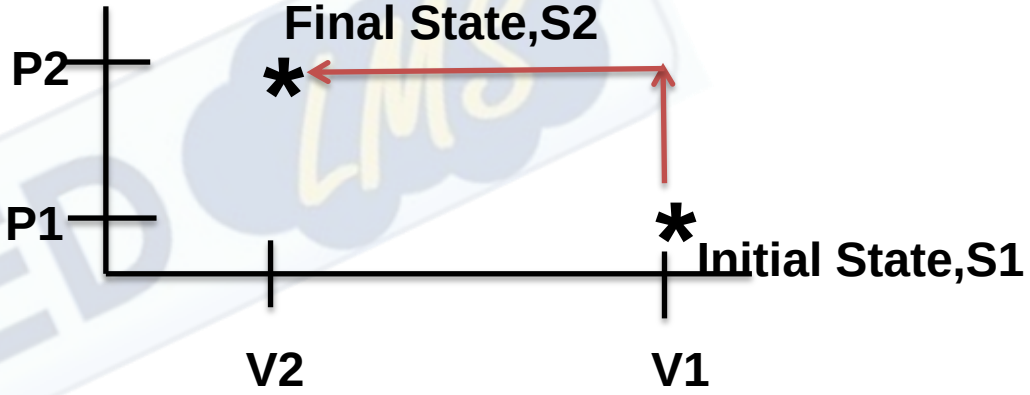
- A fixed point refers to an easily reproducible state of an arbitrarily chosen standard system.
- Suppose ice and steam point of water can be selected as reference point in one temperature scale.

Interpolation

- A measurement of change between any two reference.
- Such as T= Ax+B this is linear relationship.
- Quadratic relationship.

Path Dependency of Work





Problem Specific Heat Capacity

Problem: Calculate the amount of heat necessary to isobarrically raise the temperature of one mole of CO_2 (g) from 500 K to 2000 K, at P= 0.I MPa. [Ans=8.188 10^4 J/mol]

Table 2.1 Coefficients at $p = 0.1$ MPa for the heat capacity equation
$C^{\circ}_{p,m}/(J \cdot K^{-1} \cdot mol^{-1}) = a + 10^{-3}b \cdot T + 10^{5}c \cdot T^{-2} + 10^{-6}d \cdot T^{2}$

Substance	State	Temperature range (K)	a	b	c	d^*
CH_4	gas	298–2000	12.447	76.689	1.448	−18.004
CO	gas	298–2500	28.41	4.10	−0.46	
CO_2	gas	298–2500	44.14	9.04	−8.54	
Cl_2	gas	298–3000	36.90	0.25	−2.85	