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Thermal Parameters Formulas

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List of 14 Thermal Parameters Formulas

Thermal Parameters

1) Change in Kinetic Energy

$$\text{fx } \Delta \text{KE} = \frac{1}{2} \cdot m \cdot (v_{02}^2 - v_{01}^2)$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

$$\text{ex } 12956.98\text{J} = \frac{1}{2} \cdot 35.45\text{kg} \cdot ((30\text{m/s})^2 - (13\text{m/s})^2)$$

2) Change in Potential Energy

$$\text{fx } \Delta \text{PE} = m \cdot [g] \cdot (z_2 - z_1)$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

$$\text{ex } 32678.7\text{J} = 35.45\text{kg} \cdot [g] \cdot (111\text{m} - 17\text{m})$$

3) Latent Heat

$$\text{fx } \text{LH} = \frac{Q}{m}$$

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d_img.jpg\)](#)

$$\text{ex } 16.07898\text{J} = \frac{570\text{J}}{35.45\text{kg}}$$



4) Ratio of Specific Heat

$$fx \quad Y = \frac{C_{p \text{ molar}}}{C_{v \text{ molar}}}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$ex \quad 1.184466 = \frac{122\text{J/K}\cdot\text{mol}}{103\text{J/K}\cdot\text{mol}}$$

5) Saturated Mixture Specific Enthalpy

$$fx \quad h = h_f + \chi \cdot h_{fg}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$ex \quad 645\text{kJ/kg} = 419\text{kJ/kg} + 0.1 \cdot 2260\text{kJ/kg}$$

6) Sensible Heat Factor

$$fx \quad SHF = \frac{SH}{SH + LH}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$ex \quad 0.00892 = \frac{9\text{J}}{9\text{J} + 1000\text{J}}$$

7) Specific Heat

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

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$ex \quad 424336.5\text{J}/(\text{kg}\cdot\text{K}) = 570\text{J} \cdot 35.45\text{kg} \cdot 21\text{K}$$



8) Specific Heat at Constant Volume

$$fx \quad C_{v \text{ molar}} = \frac{\Delta Q}{N_{\text{moles}} \cdot \Delta T}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$ex \quad 2.547619 \text{J/K} \cdot \text{mol} = \frac{107 \text{J}}{2 \cdot 21 \text{K}}$$

9) Specific Heat of Gas Mixture

$$fx \quad C_{\text{gas mixture}} = \frac{n_1 \cdot C_{v1} + n_2 \cdot C_{v2}}{n_1 + n_2}$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$ex \quad 112 \text{J}/(\text{kg} \cdot \text{K}) = \frac{6 \text{mol} \cdot 113 \text{J}/(\text{kg} \cdot \text{K}) + 3 \text{mol} \cdot 110 \text{J}/(\text{kg} \cdot \text{K})}{6 \text{mol} + 3 \text{mol}}$$

10) Specific Heat Ratio

$$fx \quad \kappa = \frac{C_p}{C_v}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$ex \quad 1.39415 = \frac{1001 \text{J}/(\text{kg} \cdot \text{K})}{718 \text{J}/(\text{kg} \cdot \text{K})}$$

11) Thermal Capacity

$$fx \quad H = m \cdot c$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b_img.jpg\)](#)

$$ex \quad 4254 \text{J}/(\text{kg} \cdot \text{K}) = 35.45 \text{kg} \cdot 120 \text{J}/(\text{kg} \cdot \text{K})$$



12) Thermal Expansion

$$fx \quad \alpha = \frac{\Delta l}{l_0 \cdot \Delta T}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$ex \quad 1.7E^{-5} \text{ } ^\circ\text{C}^{-1} = \frac{0.0025\text{m}}{7\text{m} \cdot 21\text{K}}$$

13) Thermal Stress of Material

$$fx \quad \sigma = \frac{\alpha \cdot E \cdot \Delta T}{l_0}$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

$$ex \quad 4.5E^{-8}\text{MPa} = \frac{0.001 \text{ } ^\circ\text{C}^{-1} \cdot 15\text{N/m} \cdot 21\text{K}}{7\text{m}}$$

14) Total Energy of System

$$fx \quad E_{\text{system}} = PE + KE + U$$

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

$$ex \quad 200\text{J} = 4\text{J} + 75\text{J} + 121\text{J}$$



Variables Used











- **c** Specific Heat (Joule per Kilogram per K)
- **C_{gas mixture}** Specific Heat of Gas Mixture (Joule per Kilogram per K)
- **C_{p molar}** Molar Specific Heat Capacity at Constant Pressure (Joule Per Kelvin Per Mole)
- **C_p** Heat Capacity Constant Pressure (Joule per Kilogram per K)
- **C_{v molar}** Molar Specific Heat Capacity at Constant Volume (Joule Per Kelvin Per Mole)
- **C_v** Heat Capacity Constant Volume (Joule per Kilogram per K)
- **C_{v1}** Specific Heat Capacity of Gas 1 at Constant Volume (Joule per Kilogram per K)
- **C_{v2}** Specific Heat Capacity of Gas 2 at Constant Volume (Joule per Kilogram per K)
- **E** Young's Modulus (Newton per Meter)
- **E_{system}** Total Energy of System (Joule)
- **h** Saturated Mixture Specific Enthalpy (Kilojoule per Kilogram)
- **h_f** Fluid Specific Enthalpy (Kilojoule per Kilogram)
- **h_{fg}** Latent Heat of Vaporization (Kilojoule per Kilogram)
- **KE** Kinetic Energy (Joule)
- **l₀** Initial Length (Meter)
- **LH** Latent Heat (Joule)
- **m** Mass (Kilogram)
- **n₁** Number of Moles of Gas 1 (Mole)







- n_2 Number of Moles of Gas 2 (Mole)
- N_{moles} Number of Moles
- **PE** Potential Energy (Joule)
- **Q** Heat (Joule)
- **SH** Sensible Heat (Joule)
- **SHF** Sensible Heat Factor
- **U** Internal Energy (Joule)
- v_{01} Final Velocity at Point 1 (Meter per Second)
- v_{02} Final Velocity at Point 2 (Meter per Second)
- **Y** Specific Heat Ratio
- z_1 Height of Object at Point 1 (Meter)
- z_2 Height of Object at Point 2 (Meter)
- α Coefficient of Linear Thermal Expansion (Per Degree Celsius)
- **ΔKE** Change in Kinetic Energy (Joule)
- **Δl** Change in Length (Meter)
- **ΔPE** Change in Potential Energy (Joule)
- **ΔQ** Heat Change (Joule)
- **ΔT** Temperature Change (Kelvin)
- **H** Thermal Capacity (Joule per Kilogram per K)
- **κ** Specific Heat Ratio Dynamic
- **σ** Thermal Stress (Megapascal)
- **χ** Vapour Quality



Constants, Functions, Measurements used

- **Constant:** [g], 9.80665 Meter/Second²
Gravitational acceleration on Earth
- **Measurement: Length** in Meter (m)
Length Unit Conversion 
- **Measurement: Weight** in Kilogram (kg)
Weight Unit Conversion 
- **Measurement: Temperature** in Kelvin (K)
Temperature Unit Conversion 
- **Measurement: Amount of Substance** in Mole (mol)
Amount of Substance Unit Conversion 
- **Measurement: Speed** in Meter per Second (m/s)
Speed Unit Conversion 
- **Measurement: Energy** in Joule (J)
Energy Unit Conversion 
- **Measurement: Heat of Combustion (per Mass)** in Kilojoule per Kilogram (kJ/kg)
Heat of Combustion (per Mass) Unit Conversion 
- **Measurement: Specific Heat Capacity** in Joule per Kilogram per K (J/(kg*K))
Specific Heat Capacity Unit Conversion 
- **Measurement: Latent Heat** in Kilojoule per Kilogram (kJ/kg)
Latent Heat Unit Conversion 
- **Measurement: Temperature Coefficient of Resistance** in Per Degree Celsius ($^{\circ}\text{C}^{-1}$)
Temperature Coefficient of Resistance Unit Conversion 



- **Measurement: Molar Specific Heat Capacity at Constant Pressure** in Joule Per Kelvin Per Mole ($J/K \cdot mol$)
Molar Specific Heat Capacity at Constant Pressure Unit Conversion 
- **Measurement: Molar Specific Heat Capacity at Constant Volume** in Joule Per Kelvin Per Mole ($J/K \cdot mol$)
Molar Specific Heat Capacity at Constant Volume Unit Conversion 
- **Measurement: Stiffness Constant** in Newton per Meter (N/m)
Stiffness Constant Unit Conversion 
- **Measurement: Stress** in Megapascal (MPa)
Stress Unit Conversion 



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- [Temperature Formulas](#) 
- [Thermal Parameters Formulas](#) 

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