**Thermochemistry Formula Sheet:**

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| **1st Law of Thermodynamics:**Endothermic: $q=+$Exothermic: $q=-$ | **Internal Energy:**$$∆U=q+W$$ |
| **Work Done By/On a Gas:**Work done by the system: $W=-$Work done on the system: $W=+$ | $$W=-P∆V$$$$1 L\*1 atm=101.3 Joules$$ |
| **Specific Heat Capacity**: ${J}/{(g}℃)$ | $$C\_{S}=\frac{q}{m∆T}$$ |
| **Molar Heat Capacity:** ${J}/{(mol ℃)}$ | $$C\_{M}=\frac{q}{n∆T}$$ |
| **Heat Capacity:** ${J}/{℃}$ | $$C\_{H}=\frac{q}{∆T}$$ |
| **Calorimetry – Temperature Change:** | $$q=mc∆T$$$$C\_{H2O}=4.184\frac{J}{g ℃} C\_{Ice}=2.09\frac{J}{g ℃} C\_{Steam}=2.03\frac{J}{g ℃}$$ |
| **Calorimetry – Phase Change:** | $$q=m∆H q=n∆H$$H2O: $ ∆H\_{fus}=334{J}/{g} ∆H\_{fus}=6.01 {kJ}/{mol}$H2O: $ ∆H\_{vap}=2260 {J}/{g} ∆H\_{vap}=40.7 {kJ}/{mol}$ |
| **Final Temperature of a Mixture:****TA** 🡪 Initial Temp. of Substance A**TB** 🡪 Initial Temp. of Substance B | $$-q\_{A}=q\_{B}$$$$-m\_{A}C\_{A}\left(T\_{F}-T\_{A}\right)=m\_{B}C\_{B}(T\_{F}-T\_{B})$$**Note:** This equation will work if there are no phase changes. |
| **Coffee Cup Calorimeter:** | $$∆H^{o}\_{rxn}=\frac{q\_{rxn}}{n} q\_{rxn}=-q\_{H2O}$$ |
| **Enthalpy Change:** | $$∆H^{o}\_{rxn}=\sum\_{}^{}nH^{o}\_{f}\left(products\right)-\sum\_{}^{}nH^{o}\_{f}(reactants)$$ |