

## CHAPTER OVERVIEW

### 7: Calculation of Entropy and the Third Law of Thermodynamics

The Second Law can be used to infer the spontaneity of a process, as long as the entropy of the universe is considered. To do so, we need to remind ourselves that the universe can be divided into a system and its surroundings (environment). When we calculate the entropy of the universe as an indicator of the spontaneity of a process, we need to *always* consider changes in entropy in *both* the system (sys) and its surroundings (surr):

$$\Delta S^{\text{universe}} = \Delta S^{\text{sys}} + \Delta S^{\text{surr}},$$

or, in differential form:

$$dS^{\text{universe}} = dS^{\text{sys}} + dS^{\text{surr}},$$

[7.1: Calculation of  \$\Delta S\_{\text{sys}}\$](#)

[7.2: Calculation of  \$\Delta S\_{\text{surr}}\$](#)

[7.3: Clausius Theorem](#)

[7.4: The Third Law of Thermodynamics](#)

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