

EXAM #1 STUDY GUIDE

The exam will cover the material found in all of Chapter 5, Chapter 8, section 8.4, and Chapter 19 up through page 19-14. Remember, the best way to prepare is to complete the OWL assignments and do the optional Chapter Review questions. The following list is provided to help guide your preparation, but may not include everything.

You will be provided with a periodic table and a table of thermodynamic data (. You may bring a calculator and one page of notes.

Be able to:

- determine the sign of q , w , and H for endo- and exothermic reactions
- determine whether a reaction is exothermic or endothermic
- use the trends for entropy changes to predict the sign of ΔS for a reaction (without doing a calculation)
- interpret heating curves in terms of the thermodynamic variables
- determine whether a reaction is spontaneous under the given conditions
- determine whether a reaction is reactant-favored or product-favored under the given conditions
- state whether a reaction is enthalpy-favored, entropy-favored, or both

Calculations you should be prepared to do:

- Convert between different energy units
- Calculate an internal energy change given heat and work
- Specific heat calculations:
 - ⇒ Determine the specific heat for a material
 - ⇒ Given a temperature change, determine the amount of heat transferred to a material
 - ⇒ Calculate the change in temperature if provided with the amount of heat and an initial temperature
 - ⇒ Predict/calculate the equilibrium temperature of two objects that come into thermal contact
 - ⇒ Calculate the amount of heat required to change the temperature of a material by a given amount (with and without a phase change)
- Calculate the enthalpy change for a reaction
- Calculate the enthalpy change for a constant pressure or a constant volume (bomb) calorimetry experiment
- Use Hess' Law to determine the enthalpy change for a reaction
- Use the standard heat of formation to calculate an enthalpy change for a reaction under standard conditions
- Use bond enthalpies to calculate the enthalpy change for a gas phase reaction (Chapt. 8.4)
- Calculate the entropy change that occurs during a phase change
- Determine the standard entropy change for a reaction
- Calculate the change in entropy of a system's surroundings
- Calculate the standard Gibbs free energy of a reaction

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- Determine the temperature at which a reaction becomes product-favored

Terms to Know:

1st Law of Thermodynamics	2nd Law of Thermodynamics
3rd Law of Thermodynamics	bomb calorimeter
calorimetry	closed system
endothermic	energy
enthalpy	entropy
equilibrium	exothermic
Gibbs free energy	heat
heat capacity (specific heat)	Hess' Law
internal energy	isolated system
open system	nonspontaneous
standard conditions	spontaneous
standard entropy of formation	standard enthalpy of formation
standard reaction enthalpy	standard free energy of formation
standard reaction free energy	standard reaction entropy
surroundings	state function