

Properties and Changes – Supplemental Worksheet

1. Define the following:

- a) System *the part of the universe on which we are interested in.*
- b) Surroundings: *everything in the universe surrounding thermodynamic system*
- c) Universe: *the system and the surroundings in which energy is constant.*
- d) State functions: *variables that define the state of a system; independent of the pathway*
- e) Extensive properties: *dependent on the amount of material; example mass, volume, size*
- f) Intensive properties: *independent of the amount of material; example density, boiling point*

2. True or False:

- a) The amount of Energy will depend on the initial and final states. *TRUE*
- b) A closed system exchanges energy and matter with the surrounding. *FALSE. A closed system exchanges energy (not matter) with the surroundings.*
- c) Energy flows between the system and the surrounds, but remains constant. *TRUE*
- d) State function are always extensive. *FALSE. State functions can be either intensive or extensive.*
- e) The ratio of 2 extensive properties is still an extensive property. *FALSE. The ratio of the 2 extensive properties becomes an intensive property for example density or molar mass.*

3. List measurements of state functions.

- *Mass*
- *Volume*
- *Pressure*
- *Temperature*
- *Length*

4. Do extensive properties or intensive properties reveal more about an unknown substance? Explain.

Intensive properties reveal more about a substance. Extensive properties depend on the amount of material present, however, that does not help identify the substance. The substance could simply be split into multiple containers or you could only be looking at a portion of the substance. An intensive property is independent of the amount of material and therefore can you give you information based on any amount present. For example, density, melting point, or boiling point will remain constant even if the mass changes. These factors will help narrow down what potential substance you have.

5. Does the energy change associated with a physical change depend on the initial and final states? Explain.

Yes. The energy change of a physical change will vary depending on where the initial and final states are. If you are freezing water to form ice, the warmer the water is initially will determine how much energy change will be required to lower the temperature to form ice. If the water is cooler to begin with, a lower energy change will be required.