

The First Law of Thermodynamics

1. For the following processes, calculate the change in the internal energy, ΔE , of the system and indicate if the process is exothermic or endothermic.
 - a) a balloon is cooled with 0.687 kJ of heat released. The balloon decreases in size when cooled and the atmosphere does 365 J of work on the balloon.
 - b) An insulated vessel contains a gas. The gas is compressed in an insulated vessel. The surroundings do 1.58 kJ of work when compressing the gas.
 - c) A 100 g sample of aluminum is heated from 22.0°C to 65.0°C and absorbs 364 J of heat. Assume the volume of the aluminum sample is constant.
2. Indicate which of the following is not dependent on the path taken by which a change occurs.
 - a) the change in potential energy when a calculator is transferred from a table to a shelf.
 - b) the heat that is evolved when a teaspoon of sugar (sucrose) is oxidized to CO_2 (g) and H_2O (g).
 - c) the work accomplished when a gallon of propane is burned.