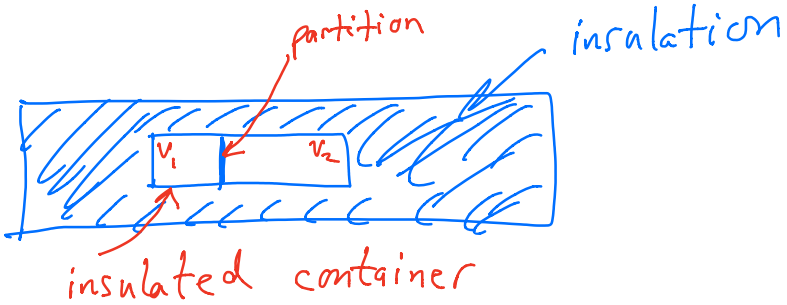
Problem

1) Consider an ice cube of 50 grams at an initial temperature of -10 °C. This amount of ice is placed in 400 grams of water at 40°C. What is the final temperature of the system after equilibrium is reached? Neglect any effects of the container. Specify your system and surroundings appropriately in order to solve the problem. This problem involves the First "Law" of Thermodynamics.

2). What amount of work is done by a Van der Waals gas expanding reversibly and isothermally from V_1 to V_2 at constant temperature T? (amount of gas remains constant).

3). For an ideal gas, U is a function of Temperature, T, only: $U = U(T)$. (you will be able to prove this later in the course).

Here is the questim: An ideal gas is originally confined to a volume V_1 in an insulated container. The total volume of the container is $(V_1 + V_2)$. The volume V_2 of the container is initially evacuated. If the partition separating volumes V_1 and V_2 is removed, and the gas expands to fill the entire container, what is the final Temperature after equilibrium is reached?



4). Consider this: 1 mole of a monatomic perfect gas initially at temperature T_0 expands from volume V_0 to $2V_0$. This process is carried in 2 different ways.

A. constant Temperature

B. constant Pressure

Calculate: The work of expansion and the heat interaction (from the systems perspective) for each case, A & B.

[Keep in mind for a perfect gas, $U(T)$ only.]