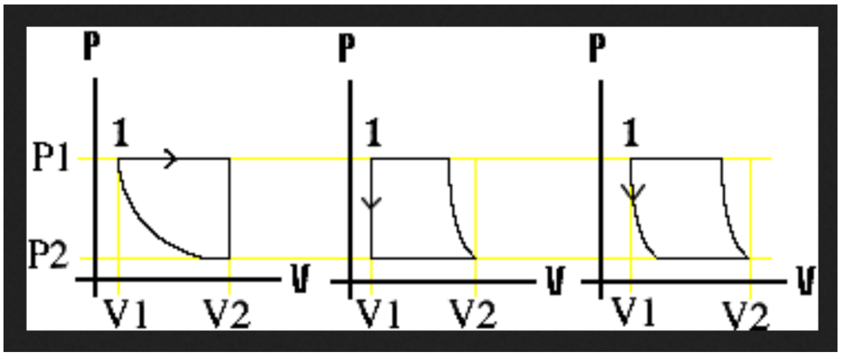
Three laboratory rats are placed inside three identical environmental chambers and subjected to three different cycles of changing volume and pressure. In each case, the maximum and minimum values of volume and pressure were the same. In each case, the chamber returns to its original volume and pressure at the end of the cycle. PV diagrams describing the three cycles are shown in the figure.



Does net heat and work play any role?

The rat on the left would be subject to the highest temperature because their pressure volume chart has the greatest area. This means that the right would be the lowest temperature using that same logic.

The rat subjected to the highest temperature is seen in cycle 2 because it has the most work done in the system. The lowest temperature is seen in cycle 1 because it has the least work done in the system.

Key: Just use the Ideal Gas Law to interpret the graphs

Using the knowledge of PV = nRT, we know that when PV is larger, temperature is going to be larger as well. The graph of the first chamber has a point at P1, V2 which are each at their highest point. This is seen by looking in the right upper hand corner. When pressure is at its highest for the other two graphs, the volume is lower. This means the first chamber has the highest temperature. By looking in the lower left hand corner, we can see where pressure and volume would meet at their lowest. The second chamber has the lowest values for P and V, so it would have the lowest temperature.

The readings discuss the molar specific heat at constant pressure and the molar specific heat at constant volume. Why have we not defined similar specific heats to describe the other two standard processes, isothermal and adiabatic? How should you find the amount of heat involved in those processes?

Isothermal processes involve no change in internal energy

In isothermal processes, the temperature is the same so the energy per degree of freedom stays the same in the process. Therefore, it isn't very necessary to discuss such values because it is likely they'll be their base values. You can find the heat involved in this process by seeing if work is done. If work is done then it'll equal the amount of energy put in/out of the system because it is isothermal. For adiabatic, there is no heat transfer, so the amount of energy in the system will remain the same unless the gas does work or work is done on it. Defining specific heats isn't needed for this because they won't vary in an adiabatic process, unlike volume and pressure.

The two processes are not dependent on specific heat but rather they have different stipulations. Isothermal's process has a constant temperature so it has no temperature change and the specific heat equation would not be applicable to determine the amount of heat involved in the process. Adiabatic process has no heat exchange, and this process too has nothing to do with the heat need to raise the temperature

Slight conceptual clarification needed

The molar specific heat is defined as the amount of energy that must be added to one mole to raise its temperature by one degree. An isothermal process is one with constant temperature which goes against raising the temperature. An adiabatic process is one which has no energy transferred which also is against this definition. For an isothermal process, you would need to use conservation of energy which is delta U = Q - W. From this, we would find Q = W which would mean to find the amount of heat, we would need to look at the work done by or on the system. For an adiabatic process, there is no heat exchanged which means there is no heat. We have defined heat to be the exchange of energy. If there's no exchange, there's no "heat."

If you are recruited to a government position for which you are totally unqualified (a.k.a., a sinecure), what kind of jobs are you best suited for?

a. isovolumetric
b. isobaric
c. adiabatic
d. isothermal