First law of thermodynamics isothermal process

Apply first law of thermodynamics to 1) an isochoric process 2) an isothermal process. What is meant by isothermal process also apply first law of thermodynamics for an isothermal process. Discuss the application of the first law of thermodynamics to an isothermal process. Apply first law of thermodynamics to 1) an adiabatic process 2) an isothermal process. Write the expression of first law of thermodynamics for an isothermal process. Application of first law of thermodynamics isothermal process. State first law of thermodynamics and apply it to isothermal and adiabatic process. First law of thermodynamics becomes in isothermal process is.

12-8-99 SEÇÕES 15.1 - 15.4 The thermodynamic thermodynamic is the study of systems involving energy in the form of heat and work. A good example of a thermodynamic system is the gas confined by a piston in a cylinder. If the gains is heated, he will expand, doing the work on the piston; This is an example of how a thermodynamic system can do the job. The temporic balance is an important concept at thermodynamic. When two systems are in temporic equilibrium, there is no liquid transfer of heat between them. This occurs when the systems are at the same temperature. In other words, systems at the same temperature will be in equilibrium temporic with each other. The first thermodynamic law refers changes in internal energy to the heat added to a system and work carried out by a system. The first law is simply a conservation of energy equation: the internal energy has a symbol U. q is positive if the heat is added to the system and negative if the heat is removed; W is positive if the work is done by the system and negative if the work is done on the system. We talked about how the heat can be transferred, so you probably have a good idea about what it means in the first law. What does it mean for the system to work? The work is simply a force multiplied by the distance moved in the direction direction. A good example of a thermodynamic system that can do the work is the gas confined by a piston in a cylinder, as shown in the diagram. If the gains is heated, he will expand and push the piston, doing so working on the piston. If the piston is pushed down, on the other hand, the piston works on the gains and the gas works negative on the piston. This is an example of how work is done by a thermodyic system. An example with numbers can make this clearer. An example of work done considers a rods in a cylinder at room temperature (t = 293 K), with a volume of 0.065 m3. The Gás is confined by a piston with a weight of 100 n and a area of 0.65 m2. The pressure above the pistons is atmospheric pressure. (a) What is the pressure of the Gás? This can be determined from a piston-free body diagram. The weight of the piston acts down, and the atmosphere exerts a descending force as well, coming from the force = Aear X. These two forces are balanced by the upward force coming from the pressure of the Gás. The piston is in equilibrium, then the balance of the forces. Therefore: Resolution for the pressure of the Gás Dé: The pressure in the gás is not much higher than the atmospheric pressure, just enough to support the weight From the piston. (B) The gains is heated, expanding it and moving the piston up. If the volume occupied by the folds doubles, how much work has the gets done? An assumption to do here is that the pressure is constant. Once the gas expanded, the pressure will surely be the same as before because the same free body diagram applies. While the expansion occurs slowly, it is reasonable to assume that the pressure is constant. If the volume has doubled, and the pressure remained the same, the ideal gas law tells us that the temperature should have doubled too. The work done by the goats can be determined by working for the forces applied by the GÃ¡s and calculating the distance. However, the force applied by the gives is the pressure of the sometimes the area, so: w = fs = PASEA ARRATE multiplied by the distance is a volume, specifically the change On the volume of the Gás. Thus, the constant pressure, the work is only the pressure multiplied by change in volume: this is positive because the forcaea moved distance are in the same direction, so This is the work done by the Gás. The pressure volume graphic as it was discussed, a giminated by a piston in a cylinder can work on the piston, being the pressure multiplied by changes in volume. If the volume does not change, no work will be done. If the pressure remains constant while the volume is changed, the Made is easy to calculate. On the other hand, if the pressure and volume are changing changing more difficult to calculate the work done. As aid in the work calculation, it is a good idea to draw a pressure volume graph (with pressure on the Y-axis and volume on the X-axis). If a system moves from one point in the graph to another and a line is drawn to connect the points, the work carried out is the area below that line. We'll go through some different thermodynamic processes and see how this works. Types of thermodyced processes There is a number of different thermodynamic processes that can change the pressure and / or volume and / or temperature of a system. To simplify issues, consider what happens when something is maintained constant. The different processes are then categorized as follows: ISOBRICA - The pressure is maintained constant. An example of an isobumic system is a gas, being slowly heated or cooled, confined by a piston in a cylinder. The work done by the system in an isobumic process is simply the pressure multiplied by the change in the volume, and the P-V graph seems: isocoric - the volume is held constant. An example of this system is a gás in a box with fixed walls. The work done is zero in an isocoranic process, and the P-V graph seems: isotemic - the temperature is maintained constant. A gas confined by a pistão in a cylinder is again an example of this, only this time the gás is not heated or cold, but the piston is slowly moved so that the gá s expands or compressed. The temperature is maintained at a constant value by placing the system in contact with a constant temperature reservory (the thermodynamic definition of a reservoir is something large enough to transfer the heat inside or out of a system without changing the temperature). If the volume increases while the temperature is constant, the pressure must decrease, and if the volume decreases the pressure should increase. Adiabatic - In an adiabactic process, no heat is added or removed from the system. Isotive and adiabatic processes should be examined in a little more detail. Isotemic processes in a isotemic process, the temperature remains constant therefore the pressure and volume are inversely proportional to each other. PV graph for a isotemic process is like this: the work done by the system is still the area under the PV curve, but because this is not a straight line, the calculation is A little complicated, and really can only be done properly using calculation. The internal energy of an ideal gas is proportional to the temperature, therefore, if the temperature is kept fixed, the internal energy is not altered. The first law, which deals with changes in internal energy, thus becomes 0 = q - w, so q = W. If the system works, the energy comes from the heat flowing to the reservoir system; If the work is done on the system, the heat flows out of the system to the reservoir. Adiabatic processes in an adiabacy process, no heat is added or removed from a system. The first law of thermodynamics is thus reduced to say that change in the internal energy of a system passing by an adiabatic change is equal to -W. As the internal energy is directly proportional to temperature, the work becomes: An example of an adiabaly process is a gas expanding so quickly that no heat can be transferred. The expansion works and the temperature droplets. This is exactly what happens to a carbon dioxide fire extinguisher, with the gables that comes out in high pressure and cooling, as it expands in the atmospheric pressure. Specific heat capacity of an ideal gás with liquids and solids that are changing temperature, the heat associated with a temperature change is given by equation: a similar equation maintains For an ideal gas, only instead of writing the equation in terms of the mass of the gás is written in terms of the number of soft gains, and uses a capital c for the Heat capacity, with J / (Mol K) units: For a Gá The heat capacity depends on what kind of thermodyic process the gas is experiencing. Usually two different different The capacities are declared by a gas, the heat capacity in the constant pressure (CP) and the heat capacity in the constant volume (CV). The value of the constant pressure is larger than the value in constant volume, because the constant pressure nor all heat enters the temperature alteration; Some go to work. On the other hand, in constant volume, no work is done, then all heat enters the temperature change. In other words, it takes less heat to produce a certain temperature change in constant volume than the constant pressure, then CV