

1 pV rectangle

We'll begin today looking at processes that happen at constant pressure, volume, temperature or entropy.

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We have spent a lot of time discussing partial derivatives and differentials, and how they relate to measurements. Another sort of measurement involves *integrals* rather than derivatives, and measures finite changes. To discuss this, it's common to use what are called pV diagrams. For instance, consider the following square.

Note You cannot assume that the material in question is an ideal gas. It could equally well be a mixture of ice and water, or a strange gooey substance that you found on a distant planet. *You can never assume that we are talking about an ideal gas unless we tell you so!*

In your groups, work out the following questions:

1. What does this figure describe? Is p a function of V ?
2. What is the net work done after one cycle of this process? How much work was done at each step?
3. What is the net energy transferred by heating over one cycle of this process? Try to find the energy transferred by heating at each step.

2 TS rectangle

Now let's look at another cycle. Let's consider the following figure, which looks similar, but is now a plot of T vs. S , and answer the following questions:

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1. What is this cycle? How would you go about running a cycle like this?
2. What is the net heat transfer over one cycle of this process? How much was transferred on each step?
3. What is the net work done after one cycle of this process? How much work was done at each step?