

Homework 2(Show all work)

1) Consider the following cycle. An ideal gas begins at point a where $P=100\text{kPa}$ and $V=0.05$ cubic meters. The gas undergoes an isobaric expansion to a point b where $V=0.25$ cubic meters. The gas then has an isovolumetric (or isochoric) change to a point c where $P=20\text{kPa}$. Finally, the gas returns to point a adiabatically, and the cycle begins again.

a) Is this possible?

b) How would you modify the Pressure at point c to make this process work?

c) As a check, please compute the following for the cycle as modified by your answer in part b. The total entropy change in the cycle, the efficiency of the cycle, the theoretical maximum efficiency for a cycle operated between the hottest and coldest temperature in the cycle.

d) Diagram this cycle on a P vs. V diagram and indicate for each stage of the cycle (e.g. a–b, b–c, c–a) the internal energy, heat flow, the entropy change. Make sure you indicate whether or not there is a gain or a loss for each stage. (What has to be true for an adiabatic process in terms of entropy?)

2) Problem 31, Chapter 20 in Fishbane: What happens to the gas if we increase the compression too much?

(check out www.howstuffworks.com/question90.htm)