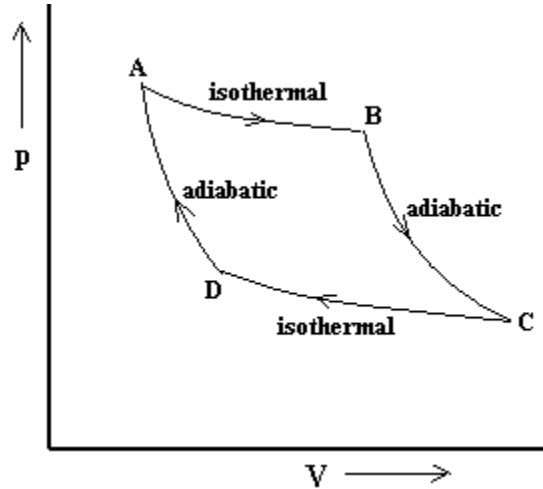


ESCI 341 – Atmospheric Thermodynamics
Exercises for Lesson 11

1. An engine operates on a Carnot cycle. The working fluid is Helium, and ideal gas with a molecular weight of 4 g/mol. The initial pressure and specific volume are 1000 mb and 6 m³/kg.



- a. What is the initial temperature?

Answer: 289K

- b. The volume at point B is 5 times greater than at point A. What is the pressure at point B?

Answer: 200 mb

- c. The volume at point C is 5 times greater than at point B. What is the pressure at point C?

Answer: 13.7 mb

- d. What is the temperature at point C?

Answer: 98.8K

- e. What is the pressure and specific volume at point D?

Answer: 68.7 mb; 29.9 m³/kg

- f. What is the heat per unit mass added to the working fluid during the high temperature expansion (A to B)?

Answer: 967 kJ/kg

g. What is the heat per unit mass removed from the working fluid during the low temperature compression (C to D)?

Answer: 331 kJ/kg

h. What is the specific work (work per unit mass) done by the working fluid during one cycle?

Answer: 636 kJ/kg