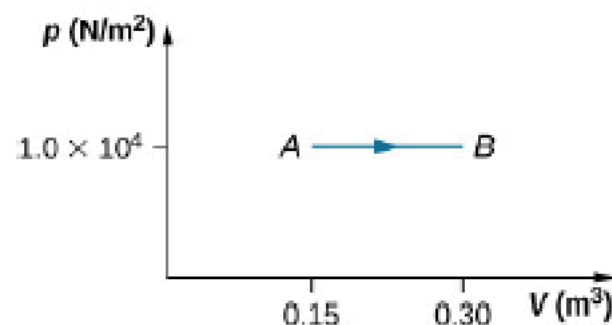


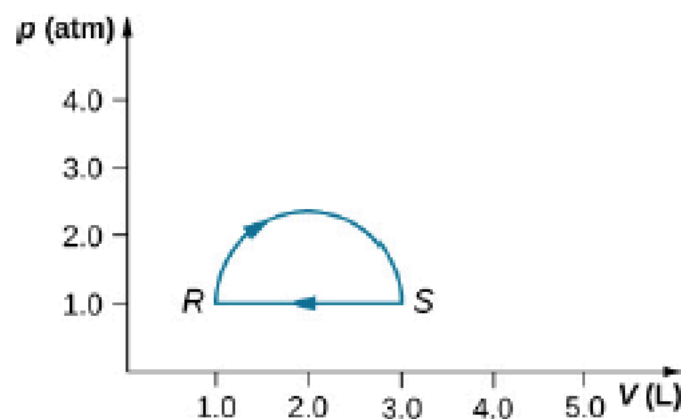
### 3.3 First Law of Thermodynamics

- 38.** When a dilute gas expands quasi-statically from 0.50 to 4.0 L, it does 250 J of work. Assuming that the gas temperature remains constant at 300 K, (a) what is the change in the internal energy of the gas? (b) How much heat is absorbed by the gas in this process?
- 39.** In an expansion of gas, 500 J of work are done by the gas. If the internal energy of the gas increased by 80 J in the expansion, how much heat does the gas absorb?
- 40.** An ideal gas expands quasi-statically and isothermally from a state with pressure  $p$  and volume  $V$  to a state with volume  $4V$ . How much heat is added to the expanding gas?

- 42.** During the isobaric expansion from A to B represented below, 3,100 J of heat are added to the gas. What is the change in its internal energy?



- 43.** (a) What is the change in internal energy for the process represented by the closed path shown below? (b) How much heat is exchanged? (c) If the path is traversed in the opposite direction, how much heat is exchanged?



45. When a gas expands along  $AB$  (see below), it does 20 J of work and absorbs 30 J of heat. When the gas expands along  $AC$ , it does 40 J of work and absorbs 70 J of heat. (a) How much heat does the gas exchange along  $BC$ ? (b) When the gas makes the transition from  $C$  to  $A$  along  $CDA$ , 60 J of work are done on it from  $C$  to  $D$ . How much heat does it exchange along  $CDA$ ?

