Questions

Chapter 19
The Kinetic Theory of Gases

19-3 Ideal Gases
M1-061

6 moles of an ideal gas are kept at a constant temperature of 60.0 °C while the pressure of the gas is increased from 1.00 atm to 4.00 atm. Find the heat involved during this process.

A) 23 kJ
B) -23 kJ
C) 4.1 kJ
D) -4.1 kJ
E) 8.3 kJ

Answer B

19-3 Ideal Gases
M1-042

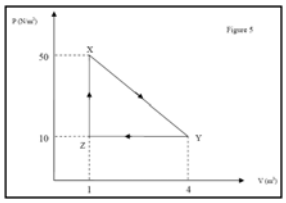
Five moles of an ideal gas are kept at a constant temperature of 53.0 degrees Celsius while the pressure of the gas is increased from 1.00 atm to 3.00 atm. Find the work done in the process.

A)zero.
B)14.9 kJ of work done by the gas.
C)2.42 kJ of work done on the gas.
D)2.42 kJ of work done by the gas.
E)14.9 kJ of work done on the gas.

Answer E

19-3 Ideal Gases
M1-041

A mass of an ideal gas of volume V at pressure P undergoes the cyclic process shown in figure 5. At which points is the gas coolest and hottest?



A)Coolest at Z and hottest at X.
B)Coolest at X and hottest at Y.
C)Coolest at Y and hottest at X.
D)Coolest at Y and hottest at Z.
E)Coolest at Z and hottest at Y.

Answer E

19-3 Ideal Gases
M1-041

The temperature of two moles of helium gas is raised from zero degrees Celsius to 100 degrees Celsius at constant pressure. Calculate the work done by the gas.

A) 1.66 kJ.
B) 1.20 kJ.
C) 6.00 kJ.
D) 10.0 kJ.
E) 1.00 kJ.

Answer A

19-4 Pressure, Temperature, and RMS speed
M1-042

Two moles of a monatomic ideal gas with an RMS speed of 254 m/s are contained in a tank that has a volume of 0.15 m^3. If the molar mass of the gas is 0.39 kg/mole, what is the pressure of the gas?

A) 6.8×10^4 Pa.
B) 2.3×10^5 Pa.
C) 1.1×10^5 Pa.
D) 3.2×10^6 Pa.
E) 2.2×10^4 Pa.

Answer C

19-4 Pressure, Temperature, and RMS speed
M1-052

A sample of argon gas (M_{Ar} = 40 g/mole) is at four times the absolute temperature of hydrogen gas (M_H = 2 g/mole). The ratio of the rms speed of the argon atoms to that of hydrogen molecules is:?

A) 0.65
B) 4.00
C) 0.45
D) 0.25
E) 1.25

Answer C

19-8 The Molar Specific Heat of an Ideal Gas
M1-062

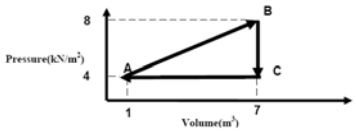
One mole of a monatomic ideal gas absorbs heat at constant pressure and its temperature rises from 40 °C to 90 °C. The heat absorbed in the process is:

A) 1.0 kJ
B) 2.4 kJ
C) 1.8 kJ
D) 3.3 kJ
E) 2.9 kJ

Answer A

19-8 The Molar Specific Heat of an Ideal Gas
M1-061

A sample of one mole of an ideal gas is taken through the cyclic process ABCA as shown in the Figure. What is the net energy added to the gas as heat during the cycle?



A) 36 kJ
B) 24 kJ
C) 6 kJ
D) 9 kJ
E) 12 kJ

Answer E

19-8 The Molar Specific Heat of an Ideal Gas
M1-042

An ideal monatomic gas originally in state A is taken reversibly to state B along the straight line path shown in figure 4. What is the change in the internal energy of the gas for this process?

A)-30 kJ.
B)30 kJ.
C)-180 kJ.
D)180 kJ.
E)-15 kJ.

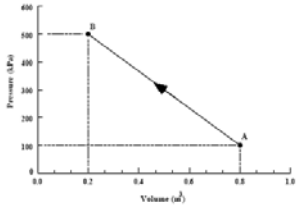


Figure 4

Answer B

19-8 The Molar Specific Heat of an Ideal Gas
M1-041

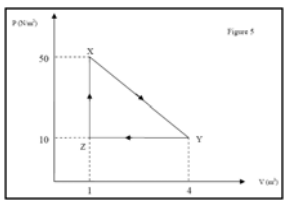
The internal energy of a fixed mass of an ideal gas depends on:

A)temperature and pressure, but not volume.
B)pressure, but not volume or temperature.
C)volume, but not temperature or pressure.
D)temperature, but not volume or pressure.
E)temperature and volume, but not pressure.

Answer D

19-8 The Molar Specific Heat of an Ideal Gas
M1-041

A system of an ideal gas undergoes the cyclic process shown in figure 5. Calculate the work done by the system along the path XY.



A)60 J.
B)-90 J.
C)90 J.
D)-60 J.
E)zero

Answer C

19-8 The Molar Specific Heat of an Ideal Gas
M1-041

A cylinder of volume 2.5 L contains 0.25 moles of helium [M = 4.0 grams/mole] at 2.0 atmospheric pressure. What is the internal energy of the gas?

A) 0.61 kJ.
B) 1.20 kJ.
C) 0.76 kJ.
D) 0.01 kJ.
E) 1.60 kJ.

Answer C

19-11 Adiabatic Expansion for an Ideal Gas
M1-062

One mole of an ideal monatomic gas, initially at 300 K, expands adiabatically to twice of its initial volume. The work done in this process is:

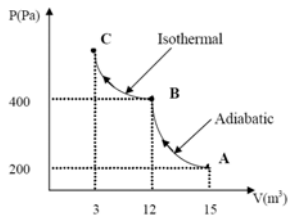
A) 3.6 kJ
B) -1.4 kJ
C) 2.9 kJ
D) -2.9 kJ
E) 1.4 kJ

Answer E

19-11 Adiabatic Expansion for an Ideal Gas
M1-062

Two moles of an ideal monatomic gas are compressed adiabatically from A to B and then further compressed isothermally from B to C as shown in the figure. Calculate the net heat transfer in the process from A to C.

A) -3.3 kJ
B) 6.7 kJ
C) -6.7 kJ
D) 3.3 kJ
E) 36 kJ



Answer C

19-11 Adiabatic Expansion for an Ideal Gas
M1-062

If the internal energy of an ideal gas decreases by the same amount as the work done by the system, then

A) the process must be isothermal
B) the process must be adiabatic
C) the process must be isobaric
D) the process must be isochoric
E) the process must be cyclic

Answer B

19-11 Adiabatic Expansion for an Ideal Gas
M1-061

Which of the following statements is INCORRECT?

A) The internal energy of a system increases if energy is added as heat Q for an isochoric process.
B) In a cyclic process the change in internal energy of the system is zero.
C) In an adiabatic process, transfer of energy as heat is zero.
D) If work is done on a system, the internal energy of the system decreases in an adiabatic process
E) Heat energy can be transferred only between bodies having different temperatures.

Answer D

19-11 Adiabatic Expansion for an Ideal Gas
M1-061

One mole of a diatomic ideal gas is initially at a temperature of 127 ^{o}C and has a volume of 0.090 m^{3}. The gas is compressed adiabatically to a volume of 0.045 m3. What is the final temperature?

A)528 K
B) 636 K
C) 105 K
D) 168 K
E) Zero

Answer A

19-11 Adiabatic Expansion for an Ideal Gas
M1-061

An ideal monatomic gas expands quasi-statically to twice its volume. If the process is isothermal, the work done by the gas is W_i. If the process is adiabatic, the work done by the gas is W_a. Which of the following is true?

A) $0 > W_a > W_i$
B) $W_a = W_i$
C) $0 = W_a < W_i$
D) $0 < W_a < W_i$
E) $0 = W_i < W_a$

Answer D

19-11 Adiabatic Expansion for an Ideal Gas
M1-042

A system of monatomic ideal gas expands to twice its original volume, doing 300 J of work in the process. The heat added to the gas will be largest if the process is

A) done isothermally.
B) cyclic.
C) done at constant pressure.
D) done adiabatically.
E) done at constant volume.

Answer C

19-11 Adiabatic Expansion for an Ideal Gas
M1-042

One mole of a monatomic ideal gas is initially at a temperature of 300 K and with a volume of 0.080 m^3. The gas is compressed adiabatically to a volume of 0.040 m^3. What is the final temperature?

A) 7.00K.
B) 100 K.
C) 522 K.
D) 999 K.
E) 476K.

Answer E