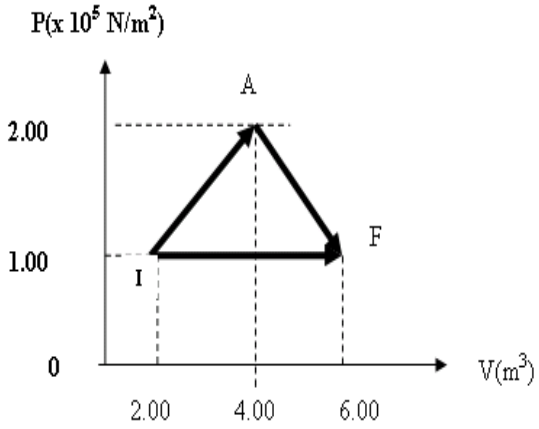
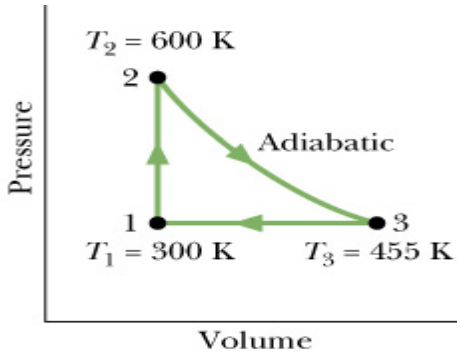
Old-Exam-Questions-Ch.#19

T081:

Q12. A gas expands from a volume of 2.00 m^3 to a volume of 6.00 m^3 along two different paths as shown in Fig 2. The heat added to the gas along path IAF equals 1.68×10^6 J. Find the heat added during path IF. (Ans: 1.48×10^6 J)



Q13. Fig. 3. shows a cycle undergone by 1.0 mol of a monatomic ideal gas. What is the heat added to the gas during the whole cycle? (Ans: 520 J)



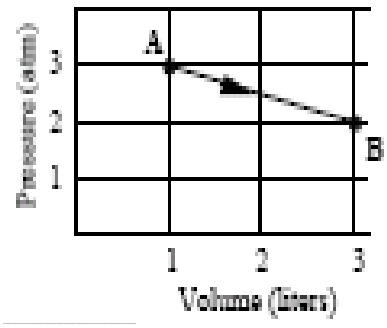
Q14. What is the change in the internal energy of a 1.00 mole of a monatomic ideal gas that goes from point 1 (T1= 455K and pressure P1 = 1.00 atm) to point 2 (T2 = 300 K and pressure P2 = 1.00 atm.)?
(Ans: – 1930 J)

Q15. The mass of an oxygen molecule is 16 times that of a hydrogen molecule. At room temperature, the ratio of the rms speed of an oxygen molecule to that of a hydrogen molecule is: (Ans: ¼)

Q16. A 0.825 mol of an ideal gas undergoes an isothermal process. The initial volume is 0.20 m^3 and the final volume is 0.30 m^3. If the heat added to the gas is 1000 J, find the temperature of the gas. (Ans: 360 K)

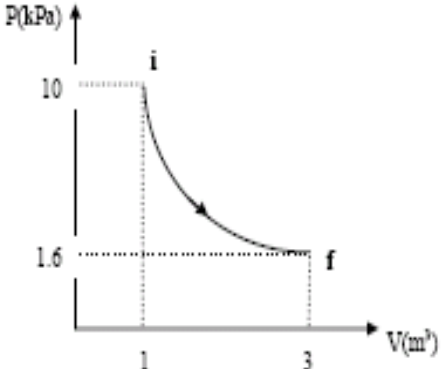
T072:

Q15. An ideal monatomic gas expands from state A to state B along the straight line path shown below in Fig. 1. Calculate the heat absorbed by the gas in the process. (Ans: +962 J)



Q16. An ideal gas is initially at a pressure of 1.40 atm and has a volume of 3.50 L. It expands isothermally to a final pressure of 0.600 atm. What is the work done in the process? (Ans: + 420 J)

Q17. One mole of an ideal monatomic gas is taken through an adiabatic process, as shown in the Fig. 2. Calculate the work done in this process. (Ans: 7.8 kJ)

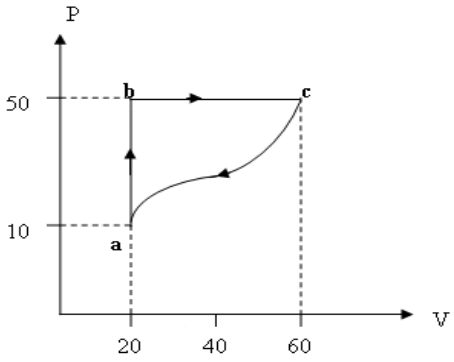


T071:

Q13. A gas initially at a temperature of 0 ^{o}C and a pressure of 100 kPa is compressed isothermally from 30 L to 20 L. What is the work required? (Ans: 1.2 kJ)

Q19. An ideal monatomic gas, undergoes an adiabatic expansion to one-third of its initial pressure. Find the ratio of the final volume to the initial volume. (Ans: 1.9)

Q20. A gas undergoes the cyclic process shown in the figure 1. The net heat absorbed during the complete cycle is 1000 J. Find the work done by the gas for the process c to a. (Ans: −1000 J)

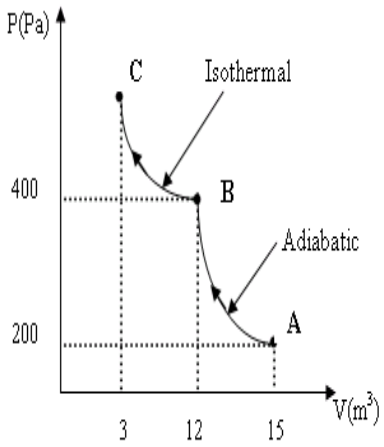


T062:

Q14. 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: (Ans: 1.4 J)

Q15. 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 (Ans: 1.0 kJ)

Q16. 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 1. Calculate the net heat transfer in the process from A to C. (Ans: – 6.7 kJ)

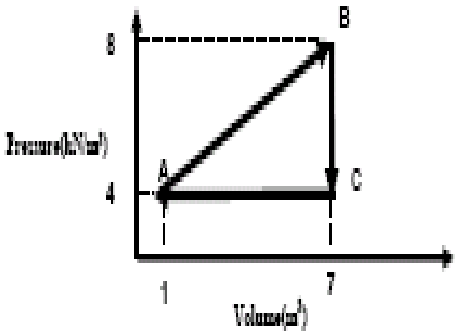


T061:

Q14. 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 m^{3}. What is the final temperature? (Ans: 528 K)

Q15. 6 moles of an ideal gas are kept at a constant temperature of 60 .0 ^{o}C while the pressure of the gas is increased from 1.00 atm to 4.00 atm. Find the heat involved during this process. (Ans: – 23 kJ)

Q16. A sample of one mole of an ideal gas is taken through the cyclic process ABCA as shown in the Figure 1. What is the net energy added to the gas as heat during the cycle? (Ans: 12 kJ)



T052:

Q2. One mole of an ideal gas is cooled at constant pressure process from 100 ^{o}C to 40 ^{o}C. Calculate the work done during the process. (Ans: –500 J)

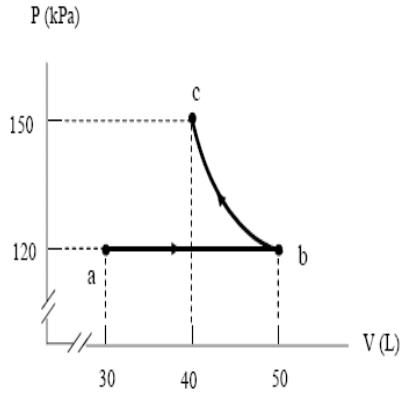
Q10. A sample of argon gas (M_{Ar} = 40 g/mole) is at four times the absolute temperature of hydrogen gas (M_{H} = 2 g/mole). The ratio of the rms speed of the argon atoms to that of hydrogen molecules is: (Ans: 0.45)

Q20. A monatomic ideal gas is compressed adiabatically from an initial pressure of 1 atm and volume of 800 cm^3 to a volume of 400 cm^3. If the initial temperature of the gas is 20 ^oC, what is the final temperature of the gas? (Take γ=1.67) (Ans: 466 K.)

T051:

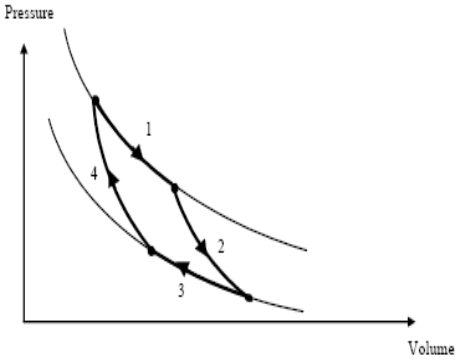
Q13. A sample of an ideal gas is compressed by a piston from 10 m^3 to 5 m^3 and simultaneously cooled from 540 K to 270 K. As a result there is: (Ans: No change in pressure.

Q14. An ideal gas expands at constant pressure of 120 kPa from (a) to (b) as shown in the Figure 1. It is then compressed isothermally to point (c) where the volume is is 40 L. Find the net work done during these two processes (Ans: 1060 J)



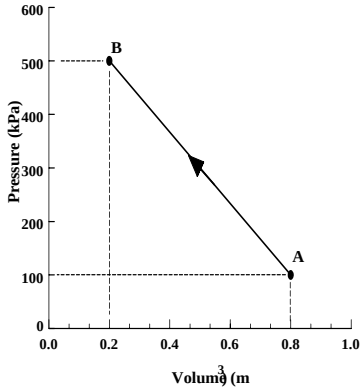
Q15. Two moles of ideal gas are at 20 ^oC and a pressure of 200 kPa. If the gas is heated to 40 ^oC, and its pressure is reduced by 30%, what is the new volume? (Ans: 37 L)

Q16. In the Figure 2 below, paths 1 and 3 are isotherms and paths 2 and 4 are adiabatic. Which path results in the highest heat transferred to the gas? (Ans: Path 1)



T042:

Q14. 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? (Ans:30 kJ**)**



Q15. 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 (Ans: done at constant pressure.)

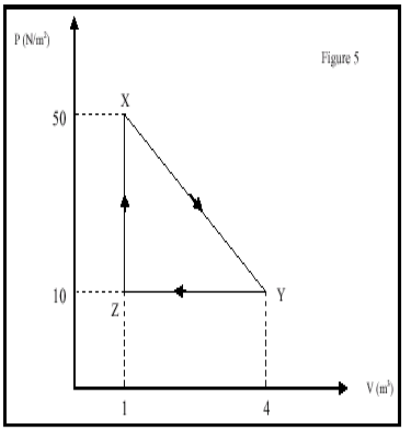
Q16. One mole of a monatomic ideal gas is initially at a temperature of 300 K and with a volume of 0.080 m^3. The gas is compressed adiabatically to a volume of 0.040 m^3. What is the final temperature? (Ans: 476 K)

Q17. 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. (Ans: 14.9 kJ of work done on the gas.)

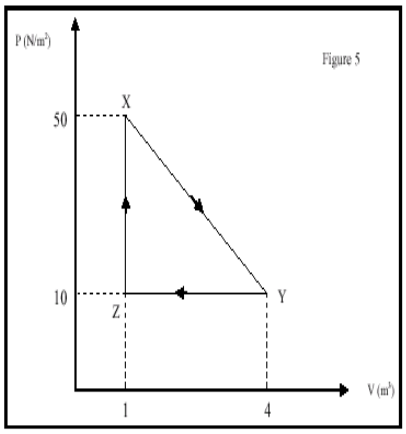
Q18. Two moles of a monatomic ideal gas with an RMS speed of 254 m/s are contained in a tank that has a volume of 0.15 m^3. If the molar mass of the gas is 0.39 kg/mole, what is the pressure of the gas? (Ans: 1.1×10^5 Pa)

T041:

Q1. 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? (Ans: Coolest at Z and hottest at X).



Q2. 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. (A1: 90 J)



Q3. 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? (Ans: 1.66 kJ)

Q4. 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 41 the internal energy of the gas? (Ans: 0.76 kJ)

Q5. A cylinder with a frictionless piston contains 0.2 kg of water at 100 degrees Celsius. What is the change in internal energy of water when it is converted to steam at 100 degrees Celsius at constant pressure of 1 atm. [Density of steam = 0.6 kg/m^3, water = 10^3 kg/m^3] (Ans: 418 kJ.)