Suggested problems: Chapter 19- HRW-Principles of Physics- ISV 10th Edition.

14. One mole of an ideal diatomic gas goes from a to c along the diagonal path in Fig. 19-18. The scale of the vertical axis is set by p_{ab}= 5.0 kPa and p_c = 0.5kPa, and the scale of the horizontal axis is set by V_{bc}= 4.0 m^3 and V_a = 2.0 m^3. During the transition, **(a)** what is the change in internal energy of the gas, and **(b)** how much energy is added to thegas as heat? **(c)** How much heat is required if the gas goes from a to c along the indirect path abc?

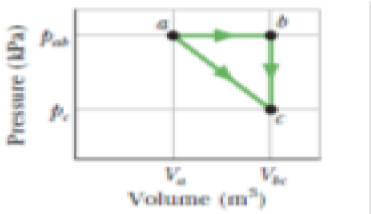

Fig. 19-18, Problem 14

Answer:(a) –20 kJ; (b) -15 kJ; (c) -10 kJ

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23. Figure 19-21 shows a cycle undergone by 2.00 mol of an ideal monatomic gas. The temperatures are T_1 = 300 K, T_2 = 600 K, and T_3 = 455 K. For 1→ 2, what are **(a)** heat Q, **(b)** the change in internal energy ΔE_{int}, and **(c)** the work done W? For 2→3, what are **(d)** Q, (e) ΔE_{int}, and **(f)** W? For 3 → 1, what are **(g)** Q, **(h)** ΔE_{int}, and **(i)** W? For the full cycle, what are **(j)** Q, **(k)** ΔE_{int}, and **(l)** W? The initial pressure at point 1 is 1.00 atm (= 1.013×10^5 Pa).What are the **(m)** volume and **(n)** pressure at point 2 and the **(o)** volume and **(p)** pressure at point 3?

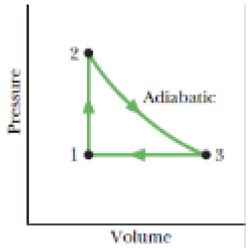

Fig. 19-21 Problem 23

Answer: (a) +7.48 kJ ; (b) +7.48 kJ ; (c) zero ; (d) zero ; (e) –3.62 kJ ; (f) +3.62 kJ ; (g) –6.44 kJ ; (h) –3.87 kJ ; (i) –2.57 kJ ; (j) +1.04 kJ ; (k) zero ; (l) +1.04 kJ ; (m) 0.0492 m^3 ; (n) 2.026×10^5 Pa = 2.00 atm; (o) 0.0745 m^3 ; (p) 1.013×10^5 Pa = 1.00 atm

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29. The volume of an ideal gas is adiabatically reduced from 350 L to 130 L. The initial pressure and temperature are 2.00 atm and 380 K. The final pressure is 8.00 atm. **(a)** Is the gas monatomic, diatomic, or polyatomic? **(b)** What is the final temperature? **(c)** How many moles are in the gas?

Answer: (a) diatomic ; (b) 565 K; (c) 22.4 mol.

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30. Under constant pressure, the temperature of 3.00 mol of anideal monatomic gas is raised by 15.0 K. What are **(a)** the work Wdone by the gas, **(b)** the energy transferred as heat Q, **(c)** thechange ΔE_{int} in the internal energy of the gas, and **(d)** the change ΔK in the average kinetic energy per atom?

Answer:(a) +374J ; (b) +935 J; (c) +561 J ; (d) $+3.11\times10^{-22}$ J

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62. Compute **(a)** the number of moles and **(b)** the number of molecules in 1.00 cm^3 of an ideal gas at a pressure of 75.0 Pa and a temperature of 285 K

Answer:(a) $3.17\text{x}10^{-8}$mol; (b) 1.9×10^{16} molecules

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63. **(a)** Compute the rms speed of a nitrogen molecule at 80.0 °C. The molar mass of nitrogen molecules (N_2) is given in Table 19-1. At what temperatures will the rms speed be **(b)** half that value and **(c)** twice that value?

Answer: **(a)** 561m/s ; (b) 88.25 K = -185 °C ; (c) 1.412x 10^3 K = 1.14x 10^3 °C
