Chapter 13, Problem 11.

A gas mixture has the following composition on a mole basis: 60 percent N_2 and 40 percent CO_2. Determine the gravimetric analysis of the mixture, its molar mass, and gas constant.

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Chapter 13, Problem 33.

A rigid tank contains 0.5 kmol of Ar and 2 kmol of N_2 at 250 kPa and 280 K. The mixture is now heated to 400 K. Determine the volume of the tank and the final pressure of the mixture.

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Thermodynamics: An Engineering Approach, 5/e, Yunus Çengel and Michael Boles,

Chapter 13, Problem 34.

A gas mixture at 300 K and 200 kPa consists of 1 kg of CO_2 and 3 kg of CH_4. Determine the partial pressure of each gas and the apparent molar mass of the gas mixture.

Chapter 13, Problem 37.

A gas mixture at 350 K and 300 kPa has the following volumetric analysis: 65 percent N_2, 20 percent O_2, and 15 percent CO_2. Determine the mass fraction and partial pressure of each gas.

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Chapter 13, Problem 38.

A rigid tank that contains 1 kg of N_2 at 25°C and 300 kPa is connected to another rigid tank that contains 3 kg of O_2 at 25°C and 500 kPa. The valve connecting the two tanks is opened, and the two gases are allowed to mix. If the final mixture temperature is 25°C, determine the volume of each tank and the final mixture pressure.

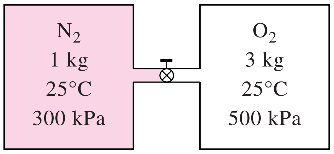

Figure P13-38

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Chapter 13, Problem 39.

A volume of 0.3 m^3 of O_2 at 200 K and 8 MPa is mixed with 0.5 m^3 of N_2 at the same temperature and pressure, forming a mixture at 200 K and 8 MPa. Determine the volume of the mixture, using (*a*) the ideal-gas equation of state, (*b*) Kay's rule, and (*c*) the compressibility chart and Amagat's law.

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Chapter 13, Problem 55.

Ethane (C_2H_6) at 20°C and 200 kPa and methane (CH_4) at 45°C and 200 kPa enter an adiabatic mixing chamber. The mass flow rate of ethane is 9 kg/s, which is twice the mass flow rate of methane. Determine (*a*) the mixture temperature and (*b*) the rate of entropy generation during this process, in kW/K. Take T_0 = 25°C.

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Chapter 13, Problem 63.

A piston–cylinder device contains 6 kg of H_2 and 21 kg of N_2 at 160 K and 5 MPa. Heat is now transferred to the device, and the mixture expands at constant pressure until the temperature rises to 200 K. Determine the heat transfer during this process by treating the mixture (*a*) as an ideal gas and (*b*) as a nonideal gas and using Amagat's law.

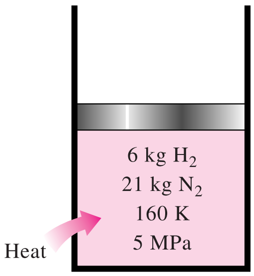

Figure P13-63

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Chapter 13, Problem 65.

Air, which may be considered as a mixture of 79 percent N_2 and 21 percent O_2 by mole numbers, is compressed isothermally at 200 K from 4 to 8 MPa in a steady-flow device. The compression process is internally reversible, and the mass flow rate of air is 2.9 kg/s. Determine the power input to the compressor and the rate of heat rejection by treating the mixture (*a*) as an ideal gas and (*b*) as a nonideal gas and using Amagat's law.

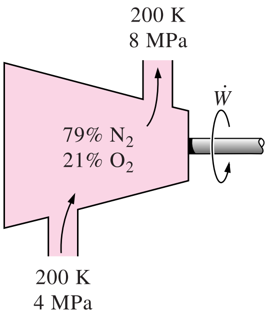

Figure P13-65

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