





Chapter 15, Problem 14.

Propane (C_3H_8) is burned with 75 percent excess air during a combustion process. Assuming complete combustion, determine the air–fuel ratio.

* Problems designated by a “C” are concept questions, and students are encouraged to answer them all. Problems designated by an “E” are in English units, and the SI users can ignore them. Problems with the  are solved using EES, and complete solutions together with parametric studies are included on the enclosed DVD. Problems with the  are comprehensive in nature and are intended to be solved with a computer, preferably using the EES software that accompanies this text.



Chapter 15, Problem 19.

Propyl alcohol (C_3H_7OH) is burned with 50 percent excess air. Write the balanced reaction equation for complete combustion and determine the air-to-fuel ratio.

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Chapter 15, Problem 26E.

One lbm of butane (C_4H_{10}) is burned with 25 lbm of air that is at $90^\circ F$ and 14.7 psia. Assuming that the combustion is complete and the pressure of the products is 14.7 psia, determine (a) the percentage of theoretical air used and (b) the dew-point temperature of the products.

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Chapter 15, Problem 32.

Octane (C_8H_{18}) is burned with dry air. The volumetric analysis of the products on a dry basis is 9.21 percent CO_2 , 0.61 percent CO , 7.06 percent O_2 , and 83.12 percent N_2 . Determine (a) the air–fuel ratio and (b) the percentage of theoretical air used.

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Chapter 15, Problem 39C.

Does the enthalpy of formation of a substance change with temperature?

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Chapter 15, Problem 40C.

The \bar{h}_f° of N_2 is listed as zero. Does this mean that N_2 contains no chemical energy at the standard reference state?

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Chapter 15, Problem 54E.

Liquid octane (C_8H_{18}) at $77^\circ F$ is burned completely during a steady-flow combustion process with 180 percent theoretical air that enters the combustion chamber at $77^\circ F$. If the products leave at 2500 R, determine (a) the air–fuel ratio and (b) the heat transfer from the combustion chamber during this process.

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Chapter 15, Problem 66.

To supply heated air to a house, a high-efficiency gas furnace burns gaseous propane (C_3H_8) with a combustion efficiency of 96 percent. Both the fuel and 140 percent theoretical air are supplied to the combustion chamber at 25°C and 100 kPa, and the combustion is complete. Because this is a high-efficiency furnace, the product gases are cooled to 25°C and 100 kPa before leaving the furnace. To maintain the house at the desired temperature, a heat transfer rate of 31,650 kJ/h is required from the furnace. Determine the volume of water condensed from the product gases per day.

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