Problem 5.1
An ideal gas occupies a volume of 100 cm^3 at 20°C and 100 Pa. Find the number of molecules of gas in the container.

Problem 5.2
A room of volume 80.0 m^3 contains air having an equivalent molar mass of 28.9 g/mol. If the temperature of the room is raised from 18.0°C to 25.0°C, what mass of air (in kilograms) will leave the room? Assume that the air pressure in the room is maintained at 101 kPa

Problem 5.3
What mass of steam initially at 130°C is needed to warm 200 g of water in a 100-g glass container from 20.0°C to 50.0°C?

Problem 5.4
A 1.0-mol sample of an ideal gas is kept at 0.0°C during an expansion from 3.0 L to 10.0 L. (a) How much work is done by the gas during the expansion? (b) How much energy transfer by heat occurs with the surroundings in this process?

Problem#1

A spray can containing a propellant gas at twice atmospheric pressure (202 kPa) and having a volume of 125 cm^3 is at 22°C. It is then tossed into an open fire. When the temperature of the gas in the can reaches 195°C, what is the pressure inside the can? Assume any change in the volume of the can is negligible.

Problem#2

A gas is compressed from 9.00 L to 2.00 L at a constant pressure of 0.800 atm. In the process, 400 J of energy leaves the gas by heat. (a) What is the work done by the gas? (b) What is the change in its internal energy?

Homework #4/2

Problem#1

An auditorium has dimensions 10.0 m x 20.0 m x 30.0 m. How many molecules of air fill the auditorium at 20.0°C and a pressure of 101 kPa?

Problem#2

Gas in a container is at a pressure of 1.50 atm and a volume of 4.00 m3. What is the work done by the gas if it expands at constant pressure to twice its initial volume?

Homework #4/3

Problem#1

An auditorium has dimensions 10.0 m x 10.0 m x 5.0 m. How many molecules of air fill the auditorium at 30.0°C and a pressure of 101 kPa?

Problem#2

The temperature of a silver bar rises by 10.0°C when it absorbs 1.23 kJ of energy by heat. The mass of the bar is 525 g. Determine the specific heat of silver.

Homework #4/5

Problem#1

The melting point of gold is 1 064°C , and the boiling point is 2 660°C. Express these temperatures in kelvins.

Problem#2

Gas in a container is at a pressure of 3.50 atm and a volume of 1.00 m3. What is the work done by the gas if it expands at constant pressure to twice its initial volume?

Homework #4/6

Problem#1

Liquid nitrogen has a boiling point of –195.81°C at atmospheric pressure. Express this temperature in kelvins.

Problem#2

Gas in a container is at a pressure of 1.50 atm and a volume of 4.00 m3. What is the work done by the gas if it is compressed at constant pressure to one quarter of its initial volume?

Homework #4/7

Problem#1

In a constant-volume gas thermometer, the pressure at 10.0°C is 1.2 atm. What is the temperature if the pressure is 1.5 atm? 1 atm is normal atmospheric pressure, equal to 101 kPa.

Problem#2

A gas is expanded from 3 m^3 to 9 m^3 at a constant pressure of 1 atm. What is the work done by the gas?

Problem#1

In a constant-volume gas thermometer, the pressure at 0°C is 1.2 atm. What is the pressure at 40.0°C? 1 atm is normal atmospheric pressure, equal to 101 kPa.

Problem#2

Gas in a container is at a pressure of 0.50 atm and a volume of 8.00 m^3. What is the work done by the gas if it is compressed at constant pressure to one quarter of its initial volume?

Problem#1

In a constant-volume gas thermometer, the pressure at 20.0°C is 0.980 atm. What is the temperature if the pressure is 0.500 atm? 1 atm is normal atmospheric pressure, equal to 101 kPa.

Problem#2

A sample of helium behaves as an ideal gas as energy is added by heat at constant pressure from 273 K to 373 K. If the gas does 20.0 J of work, what is the mass of helium present?

Homework #4/10

Problem#1

In a constant-volume gas thermometer, the pressure at 20.0°C is 0.980 atm. What is the pressure at 45.0°C? 1 atm is normal atmospheric pressure, equal to 101 kPa.

Problem#2

Water at the top of Niagara Falls has a temperature of 10.0°C. It falls through a distance of 50.0 m. Assuming that all of its potential energy goes into warming of the water, calculate the temperature of the water at the bottom of the Falls. The specific heat of water equals 1000 J/(kg K).