

Ideal Gas Problems

1. How many ping pong balls will fit in the classroom?
2. Based off of your answer to problem one, how many oxygen molecules could fit in the classroom?
3. A box has 1000 moles inside of it. If the box has a volume of 100 m^3 and is at a temperature of 350 K. What is the pressure?
4. If the volume of the box from problem 3 is cut in half and the pressure is held constant, what is the new temperature of the box?
5. A sphere has a radius of 5m, contains 5000 moles, and is at a temperature of 500K. What is the pressure?
6. The sphere from problem 5 is held at a constant volume and the temperature is reduced to 200K, what is the pressure?
7. A cylinder with a radius of 2m and a height of 5m is at a pressure of 20 Pa. If there are 1000 moles of gas in the cylinder, what is its temperature?
8. The speed of a gas in a container is 200 m/s. If there is one mole of gas in the container and each gas particle has a mass of .5 kg, what is the temperature of the gas?
9. If the temperature of the gas in problem 9 is doubled, what is its new speed?

10. Two species of gas are contained in a box. The mass of one species is .5kg. The box contains one mole of each gas. The box is held at a steady temperature. If the gases have the same velocity, what is the mass of the other species?
11. Two species of gas are contained in a box. The mass of one species is .5kg. The box contains one mole of each gas. The box is held at a steady temperature. If the gases have the same velocity, what is the mass of the other species? If the velocity of the .5kg gas is greater than the other gas by a factor of 3, what is the mass of the other gas?