**GAS problems**

 

m= nM

c= V

 n

1. The volume of a gas at 155.0 kPa changes from 22.0 L to 10.0 L. What is the new pressure if the temperature remains constant? 341 kPa

2. Is it possible for a balloon with an initial pressure of 200.0 kPa to naturally expand to four times its initial volume when the temperature remains constant and atmospheric pressure is 101.3 kPa? Not possible

3. Exactly 10.0 L of O2 at -25°C is heated to 100.0°C. What is the new volume if the pressure is kept constant? 15 L

4. A gas at a pressure of 501 kPa and a temperature of 25°C occupies a volume of 5.2 L.When the gas is heated to 100.0°C the volume increases to 7.00 L. What is the new pressure? 465.84kPa

5. A sample of O2 with an initial temperature of 50.0°C and a volume of 105 L is cooled to -25°C. The new pressure is 105.4 kPa and the new volume is 55.0 L. What was the initial pressure of the sample? 71.9 kPa

6. A sample of argon gas is at a pressure of 1.24 x104 kPa and a temperature of 24°C in a rigid 25 L tank. How many moles of argon does this tank contain? 125.6 mol

7. A 35.0 L tank contains 7.00 mol of compressed air. If the pressure inside the tank is 500.0 kPa, what is the temperature of the compressed gas? 300.8 K

8. How many grams of helium does a 25.0 L balloon contain at 102.0 kPa and 24°C? 4.13 g

9. Calculate the volume that 2.25 mol of O2(*g*) will occupy at STP. 50.4 L

10. A sample of water vapor occupies a volume of 10.5 L at 200°C and 100.0 kPa. What volume will the water vapor occupy when it is cooled to 27°C if the pressure remains constant? 6.66 L

11. What is the volume occupied by 0.355 mole of nitrogen gas at STP? 7.952 L

12. What is the volume of a container that holds 25.0 g of carbon dioxide gas at STP? 12.72 L

13. What happens to gas particles when they are compressed as it related to pressure? When they are heated as it relates to pressure? The pressure will increase as gas particles are compressed because there is less space for them to move, therefore, they collide more frequently.

The particles move at a faster speed when heated, therefore, collisions occur more frequently and with greater force. Because of this, the pressure increases.

14. Carbon dioxide produced by yeast in bread dough causes the dough to rise, even before baking. During baking, the carbon dioxide expands. Predict the final volume of 0.10 L of carbon dioxide in bread dough that is heated from 25˚C to 98˚C. 0.12L

15. An automobile tire has a volume of 27.0 L at 225 kPa and 18˚C.

a) Predict the volume of gas if the air is released with a new pressure of 98 kPa. 62 L

b) What volume would this air occupy at SATP? 62 L

16. A bicycle pump cylinder contains a volume of 600.0 mL of air at 100.0 kPa. What is the volume of the air when the pressure increases to 250 kPa? 240 mL

17. A balloon has a volume of 5.00 L at 20.0˚C and 100.0 kPa. What is its volume at 35.0˚C and 90.0 kPa? 5.84 L

18. A storage tank is designed to hold a fixed volume of butane gas at 150 kPa and 35˚C. To prevent dangerous pressure buildup, the tank has a relief valve that opens at 250 kPa. At what temperature in degrees Celsius does the valve open? 510 K

19. In a cylinder of a diesel engine, 500.0 mL of air at 40.0˚C and 1.00 atm is powerfully compressed just before the diesel fuel is injected. The resulting pressure is 35.0 atm. If the final volume is 23.0 mL, what is the final temperature in the cylinder? 504 K

20. A cylinder of helium gas has a volume of 1.0 L. The gas in the cylinder exerts a pressure of 800.0 kPa at 30˚C. Assuming no temperature change occurs when the valve is opened, what volume does the gas occupy at SATP? 8.0 L

21. A balloon containing hydrogen gas at 20˚C and a pressure of 100.0 kPa has a volume of 7.50 mL. Balloons are free to expand so that the gas pressure within them remains equal to the air pressure outside. Calculate the volume of the balloon after it rises 10 km into the upper atmosphere, where the temperature is -36˚C and the outside air pressure is 28 kPa. Assume that no hydrogen gas escapes. 20 mL