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Gas Law Problems

1] A helium-filled balloon occupies a volume of 16 m^3 at sea level. The balloon is released and rises to a point in the atmosphere where the pressure is 0.75 atm. What is its volume? (21 m^3)

2] A volume of 5.00 m^3 of neon gas is expanded until its volume becomes 12.5 m^3. The original pressure acting on the gas was 2.00 x 10^2 kPa. What is the final pressure acting on the gas? (80.0 kPa)

3] A volume of 30 m^3 of argon gas is kept under constant pressure. The gas is heated from 20.0 deg C to 293 deg C. What is the new volume? (58 m^3)

4] A gas at 60.0 deg C has a volume of 0.021 m^3. Under constant pressure, it is heated to twice its original volume. What is the temp of the gas? (393 °C)

5] Two hundred litrers of gas at 0 deg C are kept under a pressure of 150 kPa. The termp of the gas is raised to 273 deg C. The pressure is increased to 350 kPa. What is the final volume? (170 L)

6] Fifty litres of gas are kept at a temperature of 200 K and under pressure of 15 atm. The temperature of the gas is increased to 400 K. The pressure is decreased to 7.5 atm. What is the volume of the gas? (200 L)

7] A cubic meter of gas at STP is heated to 364 deg C. The pressure acting on the gas is kept constant. What volume does the gas occupy. (2.33 m^3)

8] A balloon contains 2.0×10^2 m^3 of helium while on the surface of the earth. Atmospheric pressure is 1.0 atm. Temperature is 20.0 deg C. The balloon expands freely and rises to a height where the pressure is only 0.67 atm and the temperature is -50 deg C. What is the new volume of the balloon? ($230\ m^3$)

9] The pressure acting on 20.0 liters of a gas is 120.0 kPa. If the termperature is 23 deg C, how many molecules are present? (5.88×10^{23} molecules)

10] a] What volume does 1.0 g of ammonia (NH_3) occupy at STP. (1.32 L)

b] What volume does it occupy at 100 deg C and a pressure of 1.2 atm? (1.5 L)

11] What is the mass of 40 L of uranium hexafluoride (UF_6) at 500 deg C and 4 atm of pressure? (887g)

12] Find the density in g/L of ethylene (C_2H_4) at STP. (1.25 g/L)

13] What is the density of oxygen at 20 deg C and 5 atm of pressure? (6.66 g/L)

14] A sample of an unknown gas has a mass of 28.1 g and occupies 4.8 L at STP. What is its molecular mass? (131u)

15] What is the average kinetic energy of the molecules of any gas at 100 deg C? (7.72×10^{-21} J)

16] What is the average velocity of the molecules in a smaple of oxygen at 100 deg C? The mass of an oxygen molecule is 5.3×10^{-26} kg. (540 m/s)

17] A gas sample at 200 K is heated until its temperature is 400 K. If the original average velocity of the gas molecules was v, their new average velocity is (b)

a] v b] $\sqrt{2}\,v$ c] 2v d] 4v

18] The molecules of a gas at 10 deg C would have twice as much KE at (b)

a] 20 deg C b] 293 deg C c] 566 deg C d] 859 deg C

19] An oxygen molecule has 16 times the mass of a hydrogen molecule. A sample of hydriogen gas whose molecules have the sam average KE as the molecules in a sample of oxygen at 400 K is at a temperature of (b)

a] 25K b] 400 K c] 1600 K d] 6400 K

20] A gas sample at 0 deg C is heated until:
a] the average KE doubles . What is the new temperature? (273 deg C)

b] the average velocity of its molecules doubles. What is its new temp? (819 deg C)

21] Mercury is a gas at 500 deg C. What is the average velocity of mercury atoms at this temp? The mass of a mercury atom is 3.3×10^{-25} kg. (311 m/s)