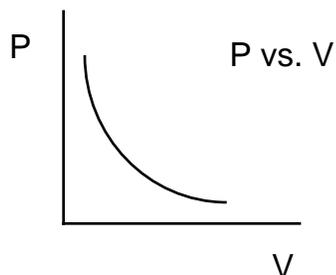


Chem11 Boyle's Law : W.S. - 30

Robert Boyle found that the volume of a gas could be reduced by increasing the pressure. He found that at a constant temperature, when the pressure was doubled, the volume was reduced to one-half of its original value. If the pressure was tripled, the volume was reduced to one-third of its original value. This is an example of an **inverse variation**.

Boyle's Law is : $PV = a \text{ constant}$ or $P_1V_1 = P_2V_2$



Problems : **Assume T is constant.**

- 1) A 0.43 L sample of gas has its pressure increased from 250 kPa to 375 kPa. Find the new volume.
- 2) A 72 mL sample of gas at S.T.P. is compressed to a pressure of 3.5 atm. Find the new volume.
- 3) Find the new pressure if 3.2 L of nitrogen at 95 kPa expands to 4.7 L.
- 4) If the volume of a gas is halved, what happens to the pressure?
- 5)a) A 10. meter column of water exerts a pressure of one atmosphere. Find the pressure on a diver at a depth of 15. meters.
b) Find the volume of a balloon at a depth of 30. meters if it has a volume at sea level of 1.0 L.
- 6) A scuba diver's tank has a volume of 12 L. It is filled with compressed air. An average person at rest consumes 28 L of air per minute at sea-level. The initial pressure in the tank is 155 atm.
 - a) The amount of time the diver can spend near sea-level is :
 - b) The amount of time the diver can spend at a depth of 10. m is :

Answers : 1) 0.29 L, 2) 21 mL, 3) 65 kPa, 4) It is doubled, 5)a) 2.5 atm., b) 0.25 L, 6)a) approximately 66 min, b) approximately 33 min.