11-1 Volume-Mass of Gases

STP - Standard Temperature and Pressure

STP = 1 atm at 0°C (273 K)

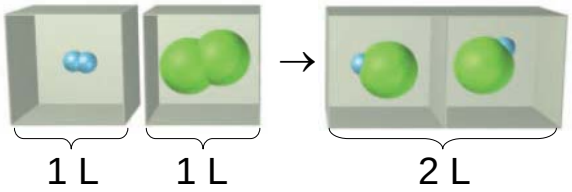
1

11-1 Volume-Mass of Gases

Gay Lussac's Law of combining volumes of gases

Volumes of gaseous reactants and products are whole number ratios

$H_2 + Cl_2 \rightarrow 2\ HCl$



1 L 1 L 2 L

2

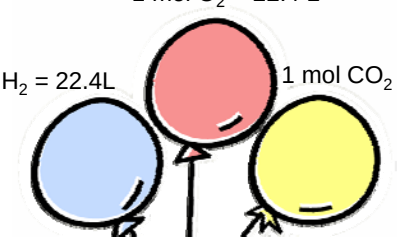
11-1 Volume-Mass of Gases

Avogadro's Law - Equal volumes of gases have an equal number of molecules

1 mol O_2 = 22.4 L

1 mol H_2 = 22.4L

1 mol CO_2 = 22.4L



1 atm at 0°C

3

11-1 Volume-Mass of Gases

Avogadro's Law - Volume varies directly with mole (n)

$V = k\ n$

n ↑ V ↑ and n ↓ V ↓

$$\frac{n_1}{V_1} = \frac{n_2}{V_2}$$

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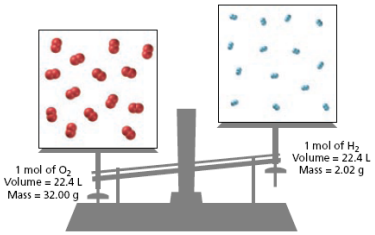
11-1 Volume-Mass of Gases

Standard Molar Volume – volume of 1 mole of a gas at STP is 22.4 L

For all gases at 1 atm and 0°C (273 K) → **22.4 L / mole**



5

10-3 Gas Laws

Using Standard Molar Volume

A chemical reaction produced 0.0680 mole of oxygen gas. What volume in liters is occupied by this gas at STP??

$$0.068\ \cancel{mol}\ O_2 \left[\frac{22.4 L}{\cancel{Mol}}\right] = 1.52\ L\ O_2$$

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