

GASES : Test Your Knowledge I

- A gas has a volume of 40 mL at 83 K and 94 kPa pressure. What is the volume at 263 K and 103 kPa (in mL)?
a) $\frac{(40)(263)(94)}{(283)(103)}$ b) $\frac{(40)(283)(94)}{(263)(103)}$ c) $\frac{(40)(263)(103)}{(283)(94)}$ d) $\frac{(40)(283)(103)}{(263)(94)}$ e) $\frac{(283)(94)}{(40)(263)(103)}$
- Given the following 3 gases: 1- CO 2- H₂ 3- Ne. These gases are mixed in a container and come to the same temperature. Arrange them in increasing order by speed of their molecules.
a) 1,2,3 b) 2,3,1 c) 1,3,2 d) 2,3,1 e) all at the same speed
- How many molecules are there in 16 grams of oxygen gas (remember its diatomic)?
a) 6.02×10^{23} b) 3.01×10^{23} c) 1.56×10^{23} d) 12.04×10^{23} e) 96.32×10^{23}
- Consider the balanced equation: $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$
How many grams of oxygen are required to produce 67.2 litres of water vapour at STP?
a) 32 b) 48 c) 64 d) 80 e) 96
- A certain volume of gas has its temperature lowered at constant pressure from 323 K to 298 K. If the final volume is 260 mL, then the initial volume (in mL) was:
a) 130 b) 240 c) 282 d) 370 e) 520
- The molar volume of a gas always refers to the volume of...
a) 16.0 grams of O₂ gas b) 6.02×10^{23} molecules c) any gas at 273 K
d) any gas at a pressure of 101.3 kPa e) any gas at STP
- A gas occupies 450 mL at a temperature of 240 K and a pressure of 120 kPa. The conditions are changed so that the volume become 15 mL at a temperate of 300 K. What is the new pressure?
a) 32 b) 50 c) 288 d) 450 e) 670
- Consider the balanced equation: $4\text{NH}_3(\text{g}) + 3\text{O}_2 \rightarrow 2\text{N}_2(\text{g}) + 6\text{H}_2\text{O}(\text{g})$
Determine the ratio, by volume, of the reactants.
a) 4:3: b) 2:6 c) 7:8 d) 3:2 e) 6:2
- What temperature on the Kelvin scale corresponds to 35°C?
a) 135 K b) 238 K c) 293 K d) 308 K e) 333 K
- 8.0 L of O₂ gas is raised in temperature from 290 K to 580 K while the pressure remains constant.
What will the new volume be (in L)?
- $2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3$
300 L of oxygen combines with sufficient sulfur dioxide to produce sulfur trioxide, all at 0°C and 90 kPa. What volume of sulfur trioxide is produced under those conditions (in L)?
a) 300 b) 450 c) 600 d) 750 e) 800
- 1.0 L of a gas is found to have a mass of 3.0 g at 0°C and 100kPa. What is its molar mass?
a) 3.0 b) 22.4 c) 67.2 d) 672 e) 800
- 2 diatomic gases A₂ and B₂ combine chemically. It is found that 2 moles of A₂ require 3 moles of B₂ to form 2 moles of the compound. Which of the following is the compound?
a) A₂B₂ b) A₂B₃ c) A₃B₂ d) A₃B e) AB₃

Ans. 1.a, 2.c, 3.b, 4.b, 5.c, 6.b, 7.d, 8.a, 9.d, 10.d, 11.c, 12.c, 13.b

Gases: Test Your Knowledge II

Show all work

1. A chemist collects 250 cm^3 of gas over water at 25.0 C and 111.0 kPa . What volume would the dry gas occupy at 2.0 C and 98.0 kPa ?
2. a) Calculate the volume occupied by 6.5 g of nitrogen gas at STP.
b) Calculate the volume occupied by this mass of gas at -40.0 C and 65.0 kPa .
3. It is found that 969 cm^3 of gas at 64.0 C and 96.11 kPa has a mass of 1.64 g . Calculate the density, in g/cm^3 , of gas at STP.
4. What is the molar mass of a gas if 375 cm^3 have mass 0.800 g at 85.0 C and
5. 100.7 kPa ?
6. Calculate the volume occupied by 3.56 g of carbon dioxide gas at 25.0 C and
7. 98.5 kPa . ($R = 8.314 \text{ kPa}\cdot\text{L}\cdot\text{mole}^{-1}\cdot\text{K}^{-1}$)
8. A 5.00 L container is filled with oxygen gas a pressure of 150.0 kPa and a temperature of 19.0 C . Calculate the mass of oxygen in the container.
9. A bulb with a volume of 225 mL contains 0.560 g of an unknown gaseous compound. The pressure is measured as 145.0 kPa at a temperature of 25.0 C . What is the molar mass of the compound?
10. 6.4 g of oxygen gas will occupy what volume at 175 C and 145 kPa ?
11. At what temperature is a gas if 0.0581 mol of it are found in a 604 cm^3 vessel at 110.4 kPa ?
12. Copper reacts with nitric acid according to the equation:
$$3 \text{ Cu}_{(s)} + 6 \text{ HNO}_{3(aq)} \rightarrow 3 \text{ Cu}(\text{NO}_3)_{2(aq)} + 2 \text{ NO}_{(g)} + 4 \text{ H}_2\text{O}_{(l)}$$
A 200.0 mL sample of 2.00 mol/L of nitric acid is added to 30.48 g of copper. What volume of $\text{NO}_{(g)}$, measured at 99.5 kPa and 20.0 C , would be produced?

- STRATEGY:
1. determine the number of moles of each reactant
 2. find the limiting reagent using the equation
 3. moles of limiting reagent \rightarrow moles of gas
 4. find volume using ideal gas equation