

Homework 02 - Ideal Gases

Question 1

1 pts

A gas is enclosed in a 10.0 L tank at 1200 mmHg pressure. Which of the following is a reasonable value for the pressure when the gas is pumped into a 5.00 L vessel?

- 24 mmHg
- 600 mmHg
- 0.042 mmHg
- 2400 mmHg

Question 2

1 pts

A sample of gas in a closed container at a temperature of 76°C and a pressure of 5.0 atm is heated to 399°C. What pressure does the gas exert at the higher temperature?

- 26 atm
- 2.6 atm
- 9.6 atm
- 0.95 atm

Question 3

1 pts

A flask containing 163 cm³ of hydrogen was collected under a pressure of 26.7 kPa. What pressure would have been required for the volume of the gas to have been 68 cm³, assuming the temperature is held constant?

- 64.0 kPa
- 11.1 kPa
- 78.2 kPa
- 32.0 kPa

Question 4

1 pts

A sample of nitrogen gas is contained in a piston with a freely moving cylinder. At 0°C, the volume of the gas is 371 mL. To what temperature must the gas be heated to occupy a volume of 557 mL?

- 137°C
- 484°C
- 212°C
- 91.2°C

Question 5

1 pts

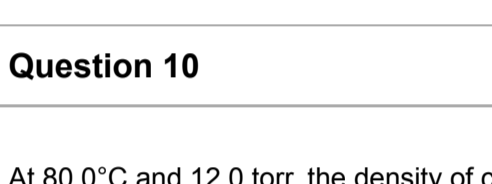
A 5.00 L sample of a gas exerts a pressure of 1040 torr at 50.0°C. In what volume would the same sample exert a pressure of 1.00 atm at 50.0°C?

- 6.84 L
- 0.581 L
- 3.33 L
- 10.5 L

Question 6

2 pts

What mass of O₂ is required to produce 14.5 g of CO₂ if the reaction has a 65.0% yield?

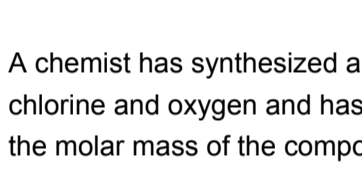


- 13.7 g
- 21.1 g
- 32.4 g
- 16.2 g

Question 7

2 pts

Consider the following reaction:



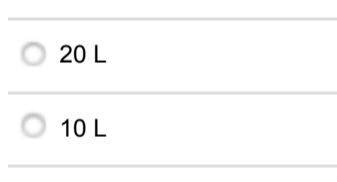
This reaction has a yield of 82.5%. How many moles of HCl are needed to produce 14.0 L of H₂ at 351 K and 1.11 atm?

- 0.540 mol
- 0.890 mol
- 1.08 mol
- 1.31 mol

Question 8

2 pts

The reaction below has a percent yield of 45.0%.



How many moles of HCl gas are produced if 15.5 L of Cl₂ at STP and excess H₂ are reacted?

- 0.156 mol
- 0.769 mol
- 0.346 mol
- 0.623 mol

Question 9

1 pts

If you have 44.8 L of nitrogen gas at standard temperature and pressure, how much will it weigh?

- 56 g
- 28 g
- 44.8 g
- 28 kg

Question 10

2 pts

At 80.0°C and 12.0 torr, the density of camphor vapor is 0.0829 g/L. What is the molar mass of camphor?

- 152 g/mol
- 34.5 g/mol
- 243 g/mol
- 3490 g/mol

Question 11

1 pts

What is the density of nitrogen gas at STP?

- 0.625 g/L
- 4.00 g/L
- 2.50 g/L
- 1.25 g/L

Question 12

1 pts

A chemist has synthesized a greenish-yellow gaseous compound that contains only chlorine and oxygen and has a density of 7.71 g/L at 36.0°C and 2188.8 mmHg. What is the molar mass of the compound?

- 67.9 g/mol
- 51.5 g/mol
- 86.9 g/mol
- 25.8 g/mol

Question 13

1 pts

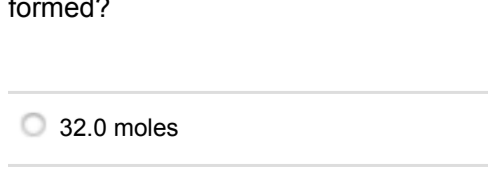
How many moles of gaseous carbon dioxide are there in 15 L at STP?

- 3.0 moles
- 0.67 moles
- 0.52 moles
- 1.0 moles

Question 14

1 pts

Consider the following reaction:



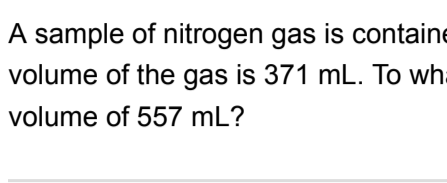
What is the final volume if 10 L of methane (CH₄) reacts completely with 20 L of oxygen?

- 20 L
- 10 L
- 30 L
- 15 L
- It cannot be determined without knowing the temperature at which this reaction takes place.

Question 15

1 pts

Calculate the volume of methane (CH₄) produced by the bacterial breakdown of 3.87 kg of sugar (C₆H₁₂O₆) at 258 K and 726 torr.

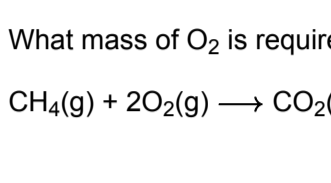


- 2610 L
- 1450 L
- 1430 L
- 858 L

Question 16

1 pts

Consider the following reaction:



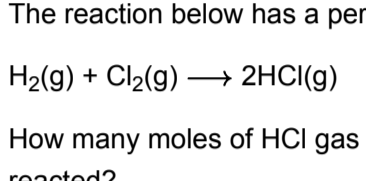
If the reaction is carried out at constant temperature and pressure, how much H₂ is required to react with 9.8 L of N₂?

- 14.7 L
- 19.6 L
- 29.4 L
- 39.2 L

Question 17

1 pts

What volume of pure oxygen gas (O₂) measured at 546 K and 1.00 atm is formed by complete dissociation of 0.5 mol of Ag₂O?



- 16.8 L
- 5.60 L
- 33.6 L
- 11.2 L

Question 18

1 pts

If the volume of a gaseous system is increased by a factor of 3 and the temperature is raised by a factor of 6, then the pressure of the system will _____ by a factor of _____.

- decrease, 0.5
- increase, 2
- decrease, 2
- decrease, 18
- increase, 0.5
- increase, 18

Question 19

1 pts

You have a sample of H₂ gas and Ar gas at the same temperature and pressure, but the H₂ gas has twice the volume of the Ar gas. Assuming the gases behave ideally, which gas has the larger NUMBER DENSITY (gas particles per volume)?

- It depends on the value of the temperature and the pressure.
- the Ar gas
- the H₂ gas
- they are the same

Question 20

1 pts

Which has the higher mass density (g/L): a sample of O₂ with a volume of 10 L, or a sample of Cl₂ with a volume of 3 L? Both samples are at the same temperature and pressure.

- It depends on the value of the temperature and pressure.
- they are the same
- the O₂
- the Cl₂

Question 21

1 pts

What is the mass of oxygen gas in a 16.6 L container at 34.0°C and 6.22 atm?

- 4.10 g
- 131 g
- 432 g
- 1180 g

Question 22

2 pts

One method of estimating the temperature of the center of the sun is based on the assumption that the center consists of gases that have an average molar mass of 2.00 g/mol. If the density of the center of the sun is 1.40 g/cm³ at a pressure of 1.30 × 10⁹ atm, calculate the temperature.

- 700°C
- 2.26 × 10¹⁰ °C
- 2.26 × 10⁷ °C
- 2.26 × 10¹³ °C

Question 23

1 pts

What is the molar mass of a gas if 0.473 g of the gas occupies a volume of 376 mL at 23.0°C and 1.90 atm?

- 16.1 g/mol
- 13.2 g/mol
- 0.0161 g/mol
- 1.25 g/mol

Question 24

1 pts

Consider the following reaction:



For this reaction, 179.2 L of CO₂ is collected at STP. How many moles of NaCl are also formed?

- 32.0 moles
- 12.5 moles
- 8.00 moles
- 16.0 moles

Question 25

1 pts

The analysis of a hydrocarbon revealed that it was 85.6281% C and 14.3719% H by mass. When 3.22 g of the gas was stored in a 1.2 L flask at -190.842°C, it exerted a pressure of 491 torr. What is the molecular formula of the hydrocarbon?

- C₄H₆
- C₄H₁₀
- C₂H₄
- C₃H₈