

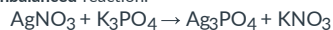
HW02 - Gases

This homework covers Chapter 1 and 2 in Chembook from sections 1.10-2.11. Some helpful videos for the challenge questions on this homework include:

- [Gas Law Stoichiometry](#)
- [Reaction Stoichiometry Limiting Reagent](#)
- [Ideal Gas Law](#)

1 4 points

Consider the following **unbalanced** reaction:



What is the sum of the coefficients in the balanced reaction?

Note: If there is no coefficient, the coefficient is an understood 1.

- 8
- 5
- 6
- 3
- 4
- 10

2 4 points

Hydrogen peroxide (H_2O_2) liquid decomposes into hydrogen gas and oxygen gas. Which of the following represents this reaction?

Note: phases are omitted in the answer choices, but do remember the standard state of hydrogen and oxygen gas.

- $\text{H}_2\text{O}_2 \rightarrow \text{H}_2 + \text{O}_2$
- $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}_2$
- $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}_2$
- $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2 + \text{O}_2$
- $\text{H}_2\text{O}_2 \rightarrow 2\text{H} + 2\text{O}$

3 4 points

In which state of matter are the molecules all spread out? This means the distance between the molecules is much larger than the size of the molecules themselves.

- gas
- liquid
- solid

4 4 points

What are the key physical properties of solids?

- the molecules are very close to each other
- molecules are in static positions relative to neighboring molecules
- molecules are in constant translational motion relative to each other
- molecules are very far apart from each other
- molecules are very close to each other but also move considerably among themselves

5 4 points

Which of the following substances listed has the smallest percentage in the make up of the typical composition of air here in Austin, TX on a humid day?

- argon (Ar)
- nitrogen (N_2)
- oxygen (O_2)
- carbon dioxide (CO_2)
- water (H_2O)

6 4 points

Which of the following layers of the atmosphere is closest to the ground?

- Troposphere
- Ozone
- Stratosphere
- Mesosphere

7 4 points

Which of the following simple ratios of nitrogen to oxygen is the most accurate for describing the air on this planet.

(ratios are all written as nitrogen : oxygen)

- 4 : 1
- 1 : 2
- 2 : 1
- 3 : 2
- 3 : 1

8 4 points

Which of the following substances is most variable in our atmosphere?

- Water vapor
- Carbon dioxide
- Nitrogen
- Argon

9 4 points

What is the name and the approximate molar mass of C_5H_{12} ?

- Heptane, 74 g/mol
- Pentane, 68 g/mole
- Hexane, 72 g/mol
- Pentane, 72 g/mol
- Pentane, 74 g/mol
- Hexane, 86 g/mol
- Pentonium, 72 g/mol

10 4 points

Which carbon compound contains the fewest carbon atoms?

- Methane
- Hexane
- Propane
- Chlorobutane

11 4 points

According to Boyle's Law, pressure and volume have a(n)...

- indirect relationship
- direct relationship
- inverse relationship
- none of these are correct

12 4 points



A container holding an ideal gas is compressed to half its original volume at constant temperature. According to Boyle's Law, the pressure of the gas...

- halves
- doubles
- triples
- quadruples

13 4 points



An inflated balloon has a volume equal to 2.3 L at 20°C. When the temperature is reduced to 10°C, the volume...

- doubles
- is halved
- decreases by a small amount
- increases by a small amount

14 4 points



Catalytic converters reduce the amount of _____ in car exhaust.

- CO
- O₃
- CO₂
- N₂

15 4 points



The two most abundant gases in an inhaled breath are...

- Nitrogen and oxygen
- Nitrogen and water vapor
- Oxygen and carbon dioxide
- Carbon dioxide and nitrogen

16 4 points



The air we exhale contains about 100 times more of which gas than the air we breathe from the atmosphere?

- Carbon dioxide
- Argon
- Oxygen
- Nitrogen

17 4 points



Which pollutant is present as a solid particulate in air?

- Soot
- Ozone
- Carbon monoxide
- Sulfur dioxide

18 4 points



Which of the following pollutants cannot be detected by odor?

- CO
- O₃
- NO_x
- SO_x

19 4 points



Refer to the graph of elevation vs pressure found [here](#). What is the approximate pressure (in kPa) at 4500 m altitude?

- 57 kPa
- 50 kPa
- 60 kPa
- 63 kPa
- 45 kPa

20 4 points



A 34 L container holds 0.80 moles of gas at 300 K. What is the pressure (in atm)?

- 0.58 atm
- 20 atm
- 440 atm
- 1.2 atm

21 4 points



A gas is expanded from 3.60 L and 76.8 kPa to 8.10 L at constant temperature. What is the final pressure?

- 2240 kPa
- 34.1 kPa
- 173 kPa
- 68.2 kPa
- 9.48 kPa
- 86.4 kPa

22 4 points



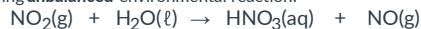
An industrial tube used to transport methane has an internal temperature equal to 18 °C. When high quantities of methane are transported, the pressure increases to 3.6 atm in 12 L of tubing. How many moles of methane (n) are present in this 12 L tubing?

- 0.038 moles
- 29 moles
- 3.6 moles
- 1.8 moles

23 4 points



Consider the following **unbalanced** environmental reaction:



First balance the reaction. Then calculate the volume of NO gas produced when 0.952 moles of NO₂ are reacted to completion with excess H₂O at STP.

Reminder: STP is 0 °C and 1 atm pressure. One mole occupies 22.4 L at STP.

- 4.80 L
- 7.11 L
- 43.8 L
- 32.7 L
- 85.7 L

24 4 points



Your friend is using the ideal gas law to solve a question. Your friend's work is shown below:

$$PV = nRT$$

$$(3.7 \text{ atm})(4.3 \text{ L}) = (0.5 \text{ moles})(R)(387.77 \text{ K})$$

What is the proper R value to complete the equation?

- 0.08206 L Torr / mol K
- 0.08206 L atm / mol K
- 8.314 J / mol K
- 62.36 L Torr / mol K
- 62.36 L atm / mol K

25 4 points



Write and balance the chemical equation for the combustion of octane to the lowest whole number coefficients. What are the reactants and products of this reaction **including coefficients of the chemical equation when balance?**

- Reactants: 2 octane, 25 oxygen
Products: 16 carbon dioxide, 18 water
- Reactants: 1 octane, 1 oxygen
Products: 1 carbon dioxide, 1 water
- Reactants: 2 octane, 25 carbon dioxide
Products: 16 oxygen, 18 water
- Reactants: 25 octane, 2 oxygen
Products: 18 carbon dioxide, 16 water