Chemistry 534 Practice Test

Name: _____

1 The volume of a gaseous system is 25 L at a pressure of 100. kPa.

While the temperature is kept constant, the volume of this system is raised to 100. L.

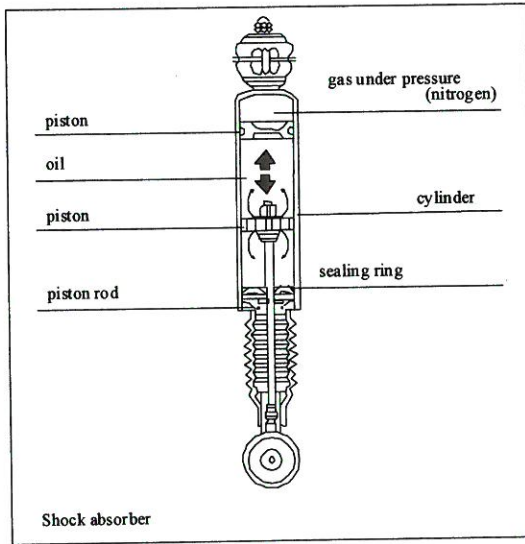What is the final pressure of the gas?

Answer: _____

2 Four moles of oxygen (O_2) occupy a volume of 44.8 litres at a pressure of 1.48 atm.

What is the temperature in degrees Celsius of the oxygen?

Answer: _____

3 The diagram shows the shock-absorber of an automobile :

gas under pressure (nitrogen)

piston

oil

piston

cylinder

sealing ring

piston rod

Shock absorber

Shock-absorber : A device for absorbing the energy of sudden impulses or shocks in machinery or structures

Reference : Petit Larousse illustré

From the list below, select the properties of gases that justify their use in a shock-absorber.

1. Malleability
2. Hardness
3. Compressibility
4. Ductibility
5. Indefinite shape
6. Viscosity
7. Conductivity

A) 2 and 7

B) 5, 6 and 7

C) 3 and 5

D) 1, 2 and 4

4 During Chantal's birthday party, on a warm summer day, several of the birthday balloons burst.

Which of the following statements best explains this occurrence?

A) Heat produces an increase in the mass of gas.

B) Pressure produces an increase in the volume of gas.

C) Heat produces an increase in the volume of gas.

D) Pressure produces an increase in the mass of gas.

5 You conducted a laboratory experiment to determine how the volume of a given gas is affected by 3 factors.

Give the mathematical equation and draw the corresponding graph:

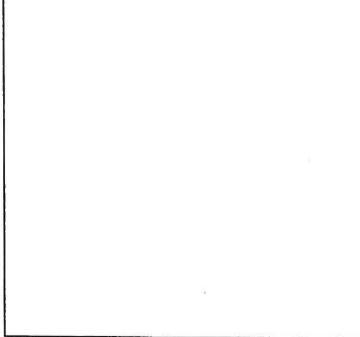**Factor 1:** _____
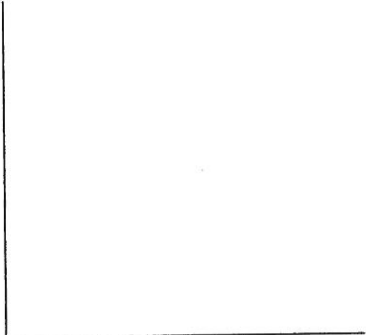
      Equation: _____

      Graph including units:

Factor 2: _____

      Equation: _____

      Graph including units:

Factor 3: _____

        Equation: _____

        Graph including units:

| 6 | Two tanks filled with gas are under the same conditions of temperature and pressure. |

One is filled with hydrogen H_2 and the other with nitrogen N_2.

According to Avogadro's law: _____

_____

This is practice--use your phone to research this question!

Which of the following statements is true?

    A)   Nitrogen molecules are more numerous than hydrogen molecules.

    B)   Nitrogen molecules are as numerous as hydrogen molecules.

    C)   The two tanks contain equal masses of gases.

    D)   Nitrogen molecules are less numerous than hydrogen molecules.

7 You bought a balloon filled with 10 L of helium. At the time, the temperature outside was 20°C and the atmospheric pressure was 100 kPa. Unfortunately, you let go of the balloon and it climbed to an altitude where the temperature was -20°C and the pressure was 80 kPa.

By how many litres did the volume of the balloon vary at this altitude?

Answer: _____

8 Which of the following procedures would result in an increase in the pressure of a gas?

A)   Reduce the number of moles without changing the volume or the temperature.

B)   Increase the temperature of the gas without changing the number of moles or the volume of the gas.

C)   Increase the volume of the gas without changing the number of moles or the temperature of the gas.

D)   Use the same number of moles of a more dense gas without changing the volume or the temperature.

9 The combustion of acetylene, $C_2H_{2(g)}$, produces carbon dioxide gas, $CO_{2(g)}$, and water vapour, $H_2O_{(g)}$.

If 15 g of acetylene is burned, what volume of $CO_{2(g)}$ will be obtained at **STP**? Stoich is your friend!
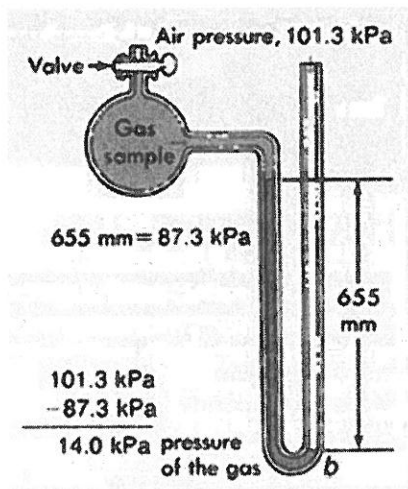
The balanced equation for this reaction is :

$$2\ C_2H_{2(g)} + 5\ O_{2(g)} \rightarrow 4\ CO_{2(g)} + 2\ H_2O_{(g)} + \text{Energy}$$

Answer: _____

10 On a given day a barometer reads 103.3 kPa.

What is the pressure of the gas in the bottle?

Air pressure, 101.3 kPa

Valve

Gas sample

655 mm = 87.3 kPa

655 mm

101.3 kPa
−87.3 kPa
14.0 kPa pressure of the gas

b

Answer: _____

11 Mark is given a sample of gas in the laboratory. He assumes that this gas behaves like an ideal gas.

To test his assumption, he conducts an experiment and makes the following observations:

Number of moles of gas	2.0 mol
Volume of gas	10.0 L
Temperature	−73°C
Pressure	404 kPa

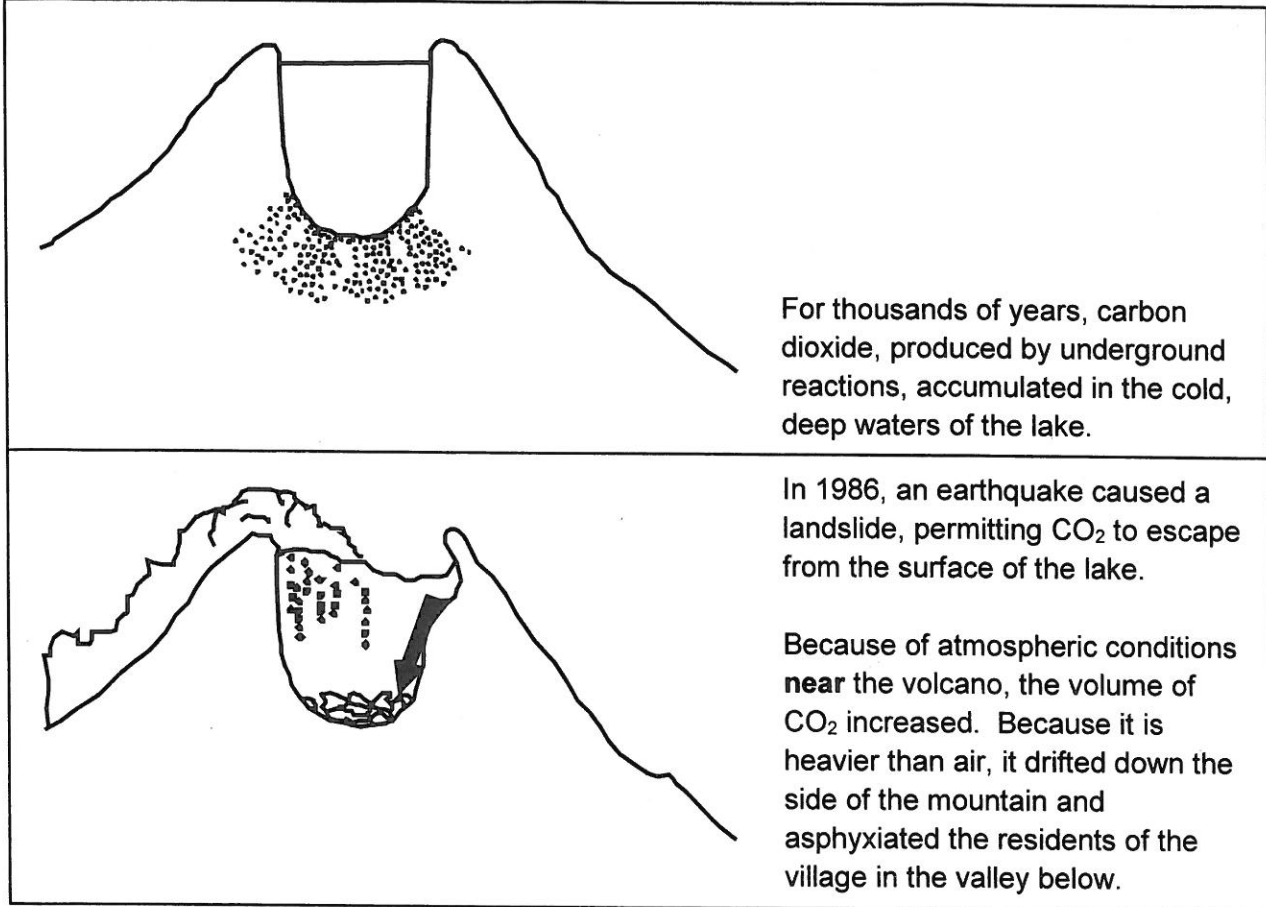Given the above information, is his assumption correct?

Answer: _____ **because** _____

12 On August 26, 1986, 1 200 residents of a village in Cameroon, West Africa, died within a few minutes.

The tragedy was attributed to a cloud of carbon dioxide that escaped from a lake inside a crater of an extinct volcano.

Here is what happened :

For thousands of years, carbon dioxide, produced by underground reactions, accumulated in the cold, deep waters of the lake.

In 1986, an earthquake caused a landslide, permitting CO_2 to escape from the surface of the lake.

Because of atmospheric conditions **near** the volcano, the volume of CO_2 increased. Because it is heavier than air, it drifted down the side of the mountain and asphyxiated the residents of the village in the valley below.

Knowing that the atmospheric conditions on August 26, 1997 favoured an increase in the volume of CO_2, which combinations below might best describe atmospheric temperature and pressure that fatal day?

A)   COLD temperature; HIGH pressure

B)   COLD temperature; LOW pressure

C)   HIGH temperature; HIGH pressure

D)   HIGH temperature; LOW pressure

13 What happens to the volume of a gas if we double the pressure, halve the number of gas molecules, and quadruple the temperature?

A) It doubles.

B) It is reduced by half.

C) It remains the same.

D) It quadruples.

14 At SATP (Standard ambient temperature and pressure), you heat ammonium nitrate (NH_4NO_3) and obtain 3.6 g of water (H_2O) and laughing gas (N_2O). Equation for the reaction:

$$NH_4NO_{3(s)} \rightarrow 2\ H_2O_{(l)} + N_2O_{(g)}$$

What volume of laughing gas will be produced?

Answer: _____

15 According to the KMT, particles of a gas:

A) attract each other but do not collide
B) repel each other and collide
C) neither attract nor repel each other but collide
D) neither attract nor repel each other and do not collide