**Unit 5: Gases Review**

**Multiple Choice:** *Identify the letter of the choice that best completes the statement or answers the question.*

1. Which of the following statements are true?

(i) As temperature goes down, molecules move more rapidly.

(ii) If the volume is constant, an increase in pressure may be a result of an increase in the number of molecules in the container.

(iii) The molecules of a gas are in constant, random, and nonlinear motion.

(iv) The volume of a given mass of gas varies directly with its absolute temperature when the pressure remains constant.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | (i) and (ii) | d. | (i) and (iii) |
| b. | (ii) and (iii) | e. | (ii) and (iv) |
| c. | (iii) and (iv) |

2. How many molecules of an ideal gas are contained in 8.2 L at –73ºC and 50.6 kPa?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.25 | d. | 7.5 x 1023 |
| b. | 1.5 x 1023 | e. | 4.2 x 10–25 |
| c. | –4.1 x 1023 |

3. N2 has a volume of 5.50 L at a pressure of 199.99 kPa and at a temperature of 25ºC. What must the temperature be if the new volume is 10.0 L, but is a constant pressure?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 370ºC | d. | 32ºC |
| b. | 269ºC | e. | –109ºC |
| c. | 154ºC |

4. The number of grams of helium in a balloon at a pressure of 99.8 kPa, a temperature of 301 K, and a volume of 0.785 L would be

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.125 g | d. | 0.278 g |
| b. | 814 g | e. | none of the above |
| c. | 337 g |

5. Sorry remove this question as well.

**Problems:**

6. What is the initial pressure of a gas if it occupied a volume of 375 mL, but now occupies a volume of 1.25 L at a pressure of 95.5 kPa. Assume that the temperature remains constant throughout the process.

7. Determine the volume occupied by 3.45 g of carbon dioxide gas at STP.

8. A sample of a gas occupies 15.5 L at 245ºC and under a pressure of 95.5 kPa. At what temperature, in degrees Celsius, will the gas occupy a volume of 20.5 L if the pressure is increased to 107 kPa?

9. What pressure, in kPa, is exerted by 75.0 g of xenon gas in a 2.25-L flask at 27ºC?

10. What mass of CO2 can be produced at a temperature of 1500ºC and an atmospheric pressure of 92.5 kPa, if 15.5 L of C2H2 gas is burned at STP conditions?

2C2H2 (g) + 5O2 (g) 🡪 2H2O(g) + 4CO2 (g)

**Unit 5: Gases Review Answer Section**

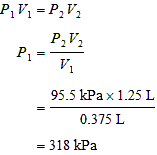
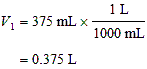
**MULTIPLE CHOICE**

1.E 2.B 3.B 4.A 5.B

**PROBLEM**

6. *V*1 = 375 mL *P*2 = 95.5 kPa *V*2 = 1.25 L *P*1 = ?

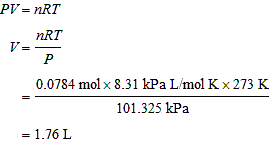
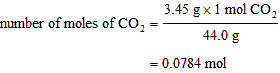
Convert mL to L for *V*1:



**The pressure of the gas was 318 kPa.**

7. *m* = 3.45 g *T* = 273 K *P* = 101.325 kPa *R* = 8.31 kPa L/mol K *V* = ?

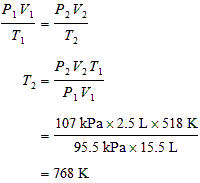
Convert mass to moles of CO2:



**The volume occupied by the CO2 is 1.76 L.**

8.

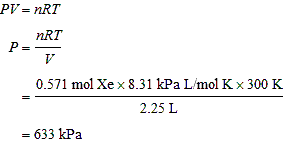
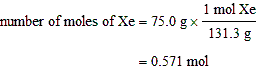
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***P*1** | ***V*1** | ***T*1** | ***P*2** | ***V*2** | ***T*2** |
| 95.5 kPa | 15.5 L | 245ºC + 273 = 518 K | 107 kPa | 20.5 L | ? |



**The new temperature will be 495ºC.**

9.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***P*** | ***V*** | ***n*** | ***R*** | ***T*** |
| ? | 2.25 L | ? | 8.31 kPa L/mol K | 27ºC + 273 = 300 K |



**The pressure in the flask will be 633 kPa.**

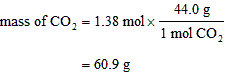
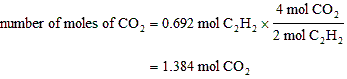
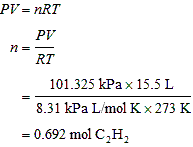
10. *P* = 101.325 kPa

*T* = 273 K

*V* = 15.5 L

*R* = 8.31 kPa L/mol K

*n* = ?



**The mass of CO2 will be 60.9 g, regardless of the temperature or pressure.**