Name _____ Date _____ Class _____

14.2 THE GAS LAWS

Section Review

Objectives

- Describe the relationship among the temperature, volume, and pressure of a gas
- Use the combined gas law to solve problems

Vocabulary

- Boyle's law
- Charles's law
- Gay-Lussac's law
- combined gas law

Key Equations

- Boyle's law: $P_1 \times V_1 = P_2 \times V_2$
- Charles's law: $\frac{V_1}{T_1} = \frac{V_2}{T_2}$
- Gay-Lussac's law: $\frac{P_1}{T_1} = \frac{P_2}{T_2}$
- combined gas law: $\frac{P_1 \times V_1}{T_1} = \frac{P_2 \times V_2}{T_2}$

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

The pressure and volume of a fixed mass of gas are **1** related. If one decreases, the other **2**. This relationship is known as **3** law. The volume of a fixed **4** of a gas is directly proportional to its **5** temperature. This relationship is known as **6** law. **7** law states that the pressure of a gas is **8** proportional to the Kelvin temperature if the volume remains constant.

These three separate gas laws can be written as a single expression called the **9** gas law. It can be used in situations in which only the **10** of gas is constant.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

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Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

_____ **11.** According to Charles's law, $T_2 = \frac{V_1 \times V_2}{T_2}$.

_____ **12.** According to Boyle's law, when the volume of a gas at constant temperature increases, the pressure decreases.

_____ **13.** A balloon with a volume of 60 L at 100 kPa pressure will expand to a volume of 120 L at a pressure of 50 kPa.

_____ **14.** In an inverse relationship, the ratio of two variable quantities is constant.

_____ **15.** When using the combined gas law, pressure must always be in kilopascals but temperature can be in kelvins or degrees Celsius.

_____ **16.** When 20.0 L of O_2 is warmed from −30.0°C to 85.0°C at constant pressure, the new volume is 29.5 L.

Part C Matching

Match each description in Column B to the correct term in Column A.

Column A	Column B
_____ **17.** Boyle's law	**a.** The volume of a fixed mass of gas is directly proportional to its Kelvin temperature if the pressure is kept constant
_____ **18.** combined gas law	**b.** $\frac{P_1 \times V_1}{T_1} = \frac{P_2 \times V_2}{T_2}$
_____ **19.** absolute zero	**c.** For a fixed mass of gas at constant temperature, the volume of gas varies inversely with pressure.
_____ **20.** Charles's law	**d.** The pressure of a gas is directly proportional to the Kelvin temperature if the volume remains constant.
_____ **21.** Gay-Lussac's law	**e.** −273.15°C

Part D Questions and Problems

Answer the following in the space provided.

22. A rigid container holds a gas at a pressure of 55 kPa and a temperature of −100.0°C. What will the pressure be when the temperature is increased to 200.0°C?

23. What is the volume of a sample of CO_2 at STP that has a volume of 75.0 mL at 30.0°C and 91 kPa?