

Problem Set 10-2 Boyles Law

Name

1. If balloon has a volume of 255 ml when the pressure is 700 mm Hg., what is its volume when the pressure falls to 500 mm Hg ?.
2. The air in a syringe has a volume of 25.6 ml when the pressure on it is 550 mm Hg. What will the volume of the gas be under a pressure of 700 mm Hg ?.
3. A balloon has a volume of 500 ml when it is released from sea level where the pressure is 760 mm Hg. What is its volume when it reaches a height where the pressure is only 550 mm Hg. ?
4. A balloon has a volume of 2.849 liters in Salt Lake City (625 mm Hg), What is its volume in Heber City (595 m Hg)?
5. If a gas has a volume of 1.286 liters at 500 mm Hg, what pressure will cause the volume to be 800 ml ?
6. If a gas has a volume of 35.0 ml at 200 mm Hg. What pressure will cause the volume to be cut in half ?

CHEMISTRY PROBLEM SET 10-2 CHARLES' LAW

NAME _____

| TEMP ° C | TEMP ° K |
|----------|----------|
| 0 | 273 |
| 50 | 323 |
| 100 | 373 |
| 25 | 298 |
| 300 | 573 |

1. If a gas has a volume of 25.6 ml at 25°C what will its volume be at 55° C. ?
2. If the pressure of a gas is 600 mm at 30°C, what is the pressure at 65°C ?
3. A balloon bursts when its volume exceeds 692 ml. If the balloon has a volume of 500 ml at 0°C, what is the highest temperature it can reach before bursting ?
4. A balloon has a volume of 40 ml. at 25°C. What temperature will cause the volume to double ?
5. The pressure in a tank is 1000 mm Hg at 25°C. What temperature will cause the pressure to become 1500 mm Hg ?
6. A glass tube contains oxygen gas at a pressure of 489 mm Hg. And a temperature of 37°C. At what temperature will the tube contain gas at a pressure of 245 mm Hg ?

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Key

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1. If balloon has a volume of 255 ml when the pressure is 700 mm Hg., what is its volume when the pressure falls to 500 mm Hg ?.

$$255 \text{ ml} \left(\frac{700 \text{ mm Hg}}{500 \text{ mm Hg}} \right) = 357 \text{ ml}$$

2. The air in a syringe has a volume of 25.6 ml when the pressure on it is 550 mm Hg. What will the volume of the gas be under a pressure of 700 mm Hg ?.

$$25.6 \text{ ml} \left(\frac{550 \text{ mm Hg}}{700 \text{ mm Hg}} \right) = 20.1 \text{ ml}$$

3. A balloon has a volume of 500 ml when it is released from sea level where the pressure is 760 mm Hg. What is its volume when it reaches a height where the pressure is only 550 mm Hg. ?

$$500 \text{ ml} \left(\frac{760 \text{ mm Hg}}{550 \text{ mm Hg}} \right) = 691 \text{ ml}$$

4. A balloon has a volume of 2.849 liters in Salt Lake City (625 mm Hg), What is its volume in Heber City (595 mmHg)?

$$2.849 \text{ L} \left(\frac{625 \text{ mm Hg}}{595 \text{ mm Hg}} \right) = 2.99 \text{ L}$$

5. If a gas has a volume of 1.286 liters at 500 mm Hg, what pressure will cause the volume to be 800 ml ?

$$500 \text{ mm Hg} \left(\frac{1.286 \text{ L}}{.800 \text{ L}} \right) = 804 \text{ mm Hg}$$

6. If a gas has a volume of 35.0 ml at 200 mm Hg. What pressure will cause the volume to be cut in half ?

$$200 \text{ mm Hg} (2) = 400 \text{ mm Hg}$$

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Key

NAME

$$^{\circ}\text{C} = \text{K} - 273 \quad \text{K} = 273 + ^{\circ}\text{C}$$

| TEMP $^{\circ}\text{C}$ | TEMP $^{\circ}\text{K}$ |
|-------------------------|-------------------------|
| 0 | 273 $^{\circ}\text{K}$ |
| -223 $^{\circ}\text{C}$ | 50 |
| 100 | 373 $^{\circ}\text{K}$ |
| 0 $^{\circ}\text{C}$ | 273 |
| 25 | 298 $^{\circ}\text{K}$ |
| 27 $^{\circ}\text{C}$ | 300 |

1. If a gas has a volume of 25.6 ml at 25 $^{\circ}\text{C}$ what will its volume be at 55 $^{\circ}\text{C}$?

$$25.6 \text{ ml} \left(\frac{328 \text{ K}}{298 \text{ K}} \right) = 28 \text{ ml} \quad \left(\begin{matrix} 298 \text{ K} \\ 328 \text{ K} \end{matrix} \right)$$

2. If the pressure of a gas is 600 mm at 30 $^{\circ}\text{C}$, what is the pressure at 65 $^{\circ}\text{C}$?

$$600 \text{ mm} \left(\frac{338 \text{ K}}{303 \text{ K}} \right) = 669 \text{ mm} \quad \left(\begin{matrix} 303 \text{ K} \\ 338 \text{ K} \end{matrix} \right) \text{ or } 670 \text{ mm}$$

3. A balloon bursts when its volume exceeds 692 ml. If the balloon has a volume of 500 ml at 0 $^{\circ}\text{C}$, what is the highest temperature it can reach before bursting?

$$0^{\circ}\text{C} = 273 \text{ K} \left(\frac{692 \text{ ml}}{500 \text{ ml}} \right) = 378 \text{ K} \text{ or } 105^{\circ}\text{C}$$

4. A balloon has a volume of 40 ml. at 25 $^{\circ}\text{C}$. What temperature will cause the volume to double?

$$25^{\circ}\text{C} = 298 \text{ K} \times 2 = 596 \text{ K} \text{ or } 323^{\circ}\text{C}$$

5. The pressure in a tank is 1000 mm Hg at 25 $^{\circ}\text{C}$. What temperature will cause the pressure to become 1500 mm Hg?

$$298 \text{ K} \left(\frac{1500 \text{ mm Hg}}{1000 \text{ mm Hg}} \right) = 447 \text{ K} \text{ or } 174^{\circ}\text{C}$$

6. A glass tube contains oxygen gas at a pressure of 489 mm Hg. And a temperature of 37 $^{\circ}\text{C}$. At what temperature will the tube contain gas at a pressure of 245 mm Hg?

$$37^{\circ}\text{C} = 310 \text{ K} \left(\frac{245 \text{ mm Hg}}{489 \text{ mm Hg}} \right) = 155 \text{ K} \text{ or } -118^{\circ}\text{C}$$