### Show All Work

1. What is the equation for Gay-Lussac’s Law?

2. What unit does temperature have to be in? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, This is similar to \_\_\_\_\_\_\_\_\_\_\_\_ law.

3. Determine the pressure change when a constant volume of a gas at 101.3 kPa is heated from 25.0° C to 35.0° C.

4. A gas has a pressure of 0.12 atm at 21.0° C. What is the pressure at standard temperature?

5. A gas has a pressure of 105.9 kPa at 43.0° C. What is the temperature at standard pressure?

## Combined Gas Law

*For each problem below, give the equation needed and show what is given (V1, T1, etc.)*

1. CORRECT THE VOLUMES OF THE FOLLOWING GASES AS INDICATED
2. 4.76 L at 6.00 C and 934 Torrs to STP
3. 149 ml at 18.0 C and 710. Torrs to 68.0 C and 618 Torrs
4. 164 ml at STP to 21.0 C and 735 Torrs
5. 955 ml at 58.0 C and 3.12 atm to 76.0 C and 923 Torrs
6. A hydrogen gas volume thermometer has a volume of 100.0 cm3 when immersed in an ice-water bath at 0.00 C. When immersed in boiling liquid chlorine, the volume of the hydrogen at the same pressure is 87.2 cubic centimeters. Find the temperature of the boiling point of hydrogen in K and C.

C. A chemist collects 372 ml of gas over WATER at 90.0 C and 832 Torr. What volume would the dry gas occupy at 2.00 C and 735 mm Hg?

### Gay-Lussac’s Law & Combined Gas Laws Worksheet

#### Answer Key

1. What is the equation for Gay-Lussac’s Law?

**P1/T1 = P2/T2**

2. What unit does temperature have to be in? Kelvin This is similar to Charles’ law.

 **K = 273.15 + C**

3. Determine the pressure change (P2) when a constant volume of a gas at 101.3 kPa (P1) is heated from 25.0° C (T1) to 35.0° C (T2).

 P1/T1 = P2/T2 P2 = P1 T2 / T1 P2 = (101.3 kPa)(308 K) / 298 K = 104.5 kPa = **105 kPa**

4. A gas has a pressure of 0.12 atm (P1) at 21.0° C (T1). What is the pressure (P2) at standard temperature (T2)?

 P1/T1 = P2/T2 P2 = P1 T2 / T1 P2 = (0.12 atm)( 273 K ) / 294 K = **0.11 atm**

5. A gas has a pressure of 105.9 kPa (P1) at 43.0° C (T2). What is the temperature (T2) at standard pressure (P2)?

P1/T1 = P2/T2 T2 = P2T1 / P1 T2 = (316 K)(101.3 kPa) / 105.9 kPa = 302.3 K = **302 K**

 P1V1T2

V2 = ----------

 P2T1



## Combined Gas Law

1. CORRECT THE VOLUMES OF THE FOLLOWING GASES AS INDICATED
2. 4.76 L (V1) at 6.00 C (T1) and 934 Torrs (P1) to STP P> V< 6 C = 279 K

STP = 273 K, 760. torr

V2 = 4.76 L x (273 K / 279 K) x (934 torr / 760. torr) = 5.72 L

1. 149 ml (V1) at 18.0 C (T1) and 710. Torrs (P1) to 68.0 C (T2) and 618 Torrs (P2)

T> V> 18.0 C = 291 K 68.0 C = 341 K

V2 = 149 ml x (341 K / 291 K) x (710. torr / 618 torr) = 200.6 ml = 201 ml

1. 164 ml (V1) at STP to 21.0 C (T2) and 735 Torrs (P2) P < V> 21.0 C = 294 K

V2 = 164 ml x (294 K / 273 K) x (760. torr / 735 torr) = 182.6 ml = 183 ml

1. 955 ml (V1) at 58.0 C (T1) and 3.12 atm (P1) to 76.0 C and 923 Torrs (P2)

58.0 C = 331 K 76.0 C = 349 K

3.12 atm x (760. torr / 1 atm) = 2371 torr OR 923 torr x (1 atm / 760. torr) = 1.21 atm

V2 = 955 ml x (349 K / 331 K) x (2371 torr / 923 torr) = 2587 ml = 2590 ml or 2.59 L

1. A hydrogen gas volume thermometer has a volume of 100.0 cm3 (V1) when immersed in an ice-water bath at 0.00 C (T1). When immersed in boiling liquid chlorine, the volume of the hydrogen at the same pressure is 87.2 cubic centimeters (V2). Find the temperature (T2) of the boiling point of hydrogen in K and C.

P is constant … V < T<

V1/T1 = V2/T2 T2 = T1V2 / V1 = 273 K x (87.2 cm3 / 100.0 cm3) = 238 K or -35.0 C

1. A chemist collects 372 ml (V1) of gas over WATER at 90.0 C (T1) and 832 Torr (P1). What volume (V2) would the dry gas occupy at 2.00 C (T2) and 735 mm Hg (P2)?

V2 = 372 ml x (275 K / 363 K) x (832 torr / 735 torr) = 319 ml or 0.319 L