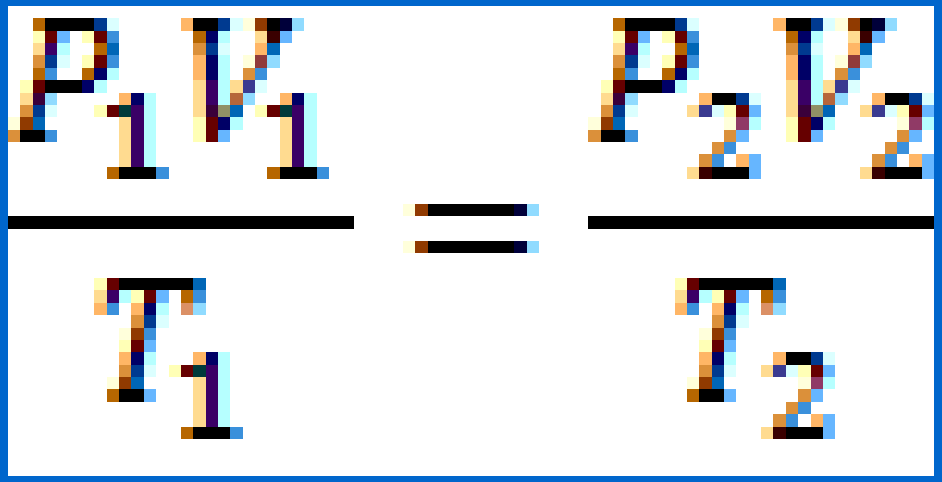
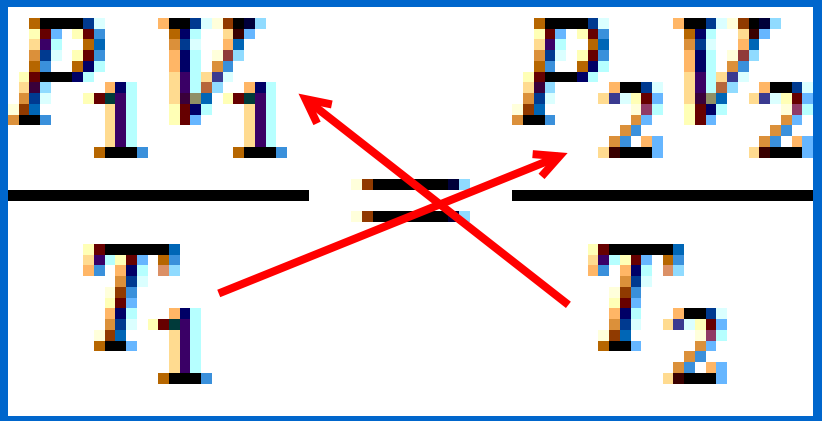
GAS LAWS



What's another way to write this equation linearly?

Combined Gas Law



$$P_1V_1T_2 = P_2V_2T_1$$

Boyle's Law (constant T)

$$P_1 V_1 T_2 = P_2 V_2 T_1$$

?

Boyle's Law

$$P_1V_1T_2 = P_2V_2T_1$$

$$P_1V_1\cancel{T_2} = P_2V_2\cancel{T_1}$$

$$P_1V_1 = P_2V_2$$

Charles' Law (constant P)

$$P_1 V_1 T_2 = P_2 V_2 T_1$$

?

Charles' Law

$$P_1V_1T_2 = P_2V_2T_1$$

$$\cancel{P_1}V_1T_2 = \cancel{P_2}V_2T_1$$

$$V_1T_2 = V_2T_1$$

Gay-Lussac's Law (constant V)

$$P_1 V_1 T_2 = P_2 V_2 T_1$$

?

Gay-Lussac's Law

$$P_1V_1T_2 = P_2V_2T_1$$

$$P_1\cancel{V_1}T_2 = P_2\cancel{V_2}T_1$$

$$P_1T_2 = P_2T_1$$

Gas Law Problems

P_1 =

V_1 =

T_1 =

P_2 =

V_2 =

T_2 =

*Remember Temp has to be in Kelvin's, so:

$K = {}^{o}C + 273$

**Get your CALCULATORS READY!

$$P_1V_1T_2 = P_2V_2T_1$$

Gas Laws Practice Problems

1) Write your answer and state which gas law is being used to solve each.

CLICK TO START

QUESTION #1

Helium occupies 3.8 L at -45°C.
What volume will it occupy at 45°C?

ANSWER

ANSWER #1

$V_1 = 3.8$ L

$T_1 = -45°C = 228$ K

$V_2 = ?$

$T_2 = 45°C = 318$ K

CHARLES' LAW

$\cancel{P_1} V_1 T_2 = \cancel{P_2} V_2 T_1$

$V_2 = 5.3$ L

BACK TO PROBLEM

NEXT

QUESTION #2

Ammonia gas occupies a volume of 450. mL at 720. mm Hg. What volume will it occupy at standard pressure?

ANSWER

ANSWER #2

$V_1 = 450.\ mL$

$P_1 = 720.\ mm\ Hg$

$V_2 = ?$

$P_2 = 760.\ mm\ Hg$

BOYLE'S LAW

$P_1V_1\cancel{T_2} = P_2V_2\cancel{T_1}$

$V_2 = 426\ mL$

BACK TO PROBLEM

NEXT

QUESTION #3

A gas at STP is cooled to -185°C. What pressure in atmospheres will it have at this temperature (volume remains constant)?

ANSWER

ANSWER #3

$P_1 = 1$ atm

$T_1 = 273$ K

$P_2 = ?$

$T_2 = -185°C = 88$ K

GAY-LUSSAC'S LAW

$P_1 \cancel{V_1} T_2 = P_2 \cancel{V_2} T_1$

$P_2 = 0.32$ atm

BACK TO PROBLEM

NEXT

QUESTION #4

A gas occupies 1.5 L at 850 mm Hg and 15°C. At what pressure will this gas occupy 2.5 L at 30.0°C?

ANSWER

ANSWER #4

$V_1 = 1.5$ L

$P_1 = 850$ mm Hg

$T_1 = 15°C = 288$ K

$P_2 = ?$

$V_2 = 2.5$ L

$T_2 = 30.0°C = 303$ K

COMBINED GAS LAW

$P_1V_1T_2 = P_2V_2T_1$

$P_2 = 540$ mm Hg

BACK TO PROBLEM

NEXT

QUESTION #5

Chlorine gas has a pressure of 1.05 atm at 25°C. What pressure will it exert at 75°C?

ANSWER

ANSWER #5

$P_1 = 1.05$ atm

$T_1 = 25°C = 298$ K

$P_2 = ?$

$T_2 = 75°C = 348$ K

GAY-LUSSAC'S LAW

$P_1 \cancel{V_1} T_2 = P_2 \cancel{V_2} T_1$

$P_2 = 1.23$ atm

BACK TO PROBLEM

NEXT

QUESTION #6

A gas occupies 256 mL at 720 torr and 25°C. What will its volume be at STP?

ANSWER

ANSWER #6

$V_1 = 256$ mL

$P_1 = 720$ torr

$T_1 = 25°C = 298$ K

$V_2 = ?$

$P_2 = 760.$ torr

$T_2 = 273$ K

COMBINED GAS LAW

$P_1V_1T_2 = P_2V_2T_1$

$V_2 = 220$ mL

BACK TO PROBLEM

NEXT

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QUESTION #7

At 27°C, fluorine occupies a volume of 0.500 L. To what temperature in degrees **Celsius** should it be lowered to bring the volume to 0.200 L?

ANSWER

ANSWER #7

$T_1 = 27^oC = 300.\ K$

$V_1 = 0.500\ L$

$T_2 = ?^oC$

$V_2 = 200.\ mL = 0.200\ L$

CHARLES' LAW

$\cancel{P_1} V_1 T_2 = \cancel{P_2} V_2 T_1$

$T_2 = -153^oC$

(120 K)

BACK TO PROBLEM

NEXT

QUESTION #8

A gas occupies 0.125 L at 125 kPa. After the temperatures changes to 75°C and it is depressurized to 100.0 kPa, it occupies 0.100 L. What was the original temperature of the gas?

ANSWER

ANSWER #8

$V_1 = 0.125$ L

$P_1 = 125$ kPa

$T_2 = 75°C = 348$ K

$P_2 = 100.0$ kPa

$V_2 = 0.100$ L

$T_1 = ?$

COMBINED GAS LAW

$P_1V_1T_2 = P_2V_2T_1$

$T_1 = 544$ K

(271°C)

BACK TO PROBLEM

NEXT

QUESTION #9

A 3.20-L sample of gas has a pressure of 102 kPa. If the volume is reduced to 0.650 L, what pressure will the gas exert?

ANSWER

ANSWER #9

$V_1 = 3.20$ L

$P_1 = 102$ kPa

$V_2 = 0.650$ L

$P_2 = ?$

BOYLE'S LAW

$P_1 V_1 \cancel{T_2} = P_2 V_2 \cancel{T_1}$

$P_2 = 502$ kPa

BACK TO PROBLEM

NEXT

1
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QUESTION #10

A gas at 2.5 atm and 25°C expands to 750 mL after being cooled to 0.0°C and depressurized to 122 kPa. What was the original volume of the gas?

ANSWER

ANSWER #10

$P_1 = 2.5$ atm

$T_1 = 25°C = 298$ K

$V_2 = 750$ mL

$T_2 = 0.0°C = 273$ K

$P_2 = 122$ kPa $= 1.20$ atm

$V_1 = ?$

COMBINED GAS LAW

$P_1V_1T_2 = P_2V_2T_1$

$V_1 = 390$ mL

BACK TO PROBLEM

EXIT