Key

# Ideal Gas Law Worksheet PV = nRT

Use the ideal gas law, "PerV-nRT", and the universal gas constant ***R = 0.0821 L*atm / K*mol***
to solve the following problems:
*If* pressure is needed in kPa then convert by multiplying by *101.3kPa / 1atm* to get
***R =8.31 kPa*L / (K*mole)***

1) If I have 4 moles of a gas at a pressure of 5.6 atm and a volume of 12 liters, what is the temperature?

$PV=nRT$

$T=\frac{PV}{nR}=\frac{(5.6\,atm)(12\,L)}{4\,mol\cdot 0.0821\,\frac{atm\cdot L}{mol\cdot K}}$

$T=204.63\,K$

2) If I have an unknown quantity of gas at a pressure of 1.2 atm, a volume of 31 liters, and a temperature of 87 $^0$C, how many moles of gas do I have?

$PV=nRT$

$n=\frac{PV}{RT}=\frac{1.2\,atm\cdot 31\,L}{0.0821\,\frac{atm\cdot L}{mol\cdot K}\cdot 360\,K}$

$n=1.2586\,mol$

3) If I contain 3 moles of gas in a container with a volume of 60 liters and at a temperature of 400 K, what is the pressure inside the container?

$PV=nRT$

$P=\frac{nRT}{V}=\frac{3\,mol\cdot 0.0821\,\frac{atm\cdot L}{mol\cdot K}\cdot 400\,K}{60\,L}$

$P=1.642\,atm$ or $P=166.29\,kPa$

4) If I have 7.7 moles of gas at a pressure of 0.09 atm and at a temperature of 56 $^0$C, what is the volume of the container that the gas is in?

$PV=nRT$

$V=\frac{nRT}{P}=\frac{7.7\,mol\cdot 0.0821\,\frac{atm\cdot L}{mol\cdot K}\cdot 329\,K}{0.09\,atm}$

$V=2310.93\,L$

5) If I have 17 moles of gas at a temperature of 67 $^0$C, and a volume of 88.89 liters, what is the pressure of the gas?

$PV=nRT$

$P=\frac{nRT}{V}=\frac{17\,mol\cdot 0.0821\,\frac{atm\cdot L}{mol\cdot K}\cdot 340\,K}{88.89\,L}$

$P=5.34\,atm$ or $P=541.61\,kPa$

6) If I have an unknown quantity of gas at a pressure of 0.5 atm, a volume of 25 liters, and a temperature of 300 K, how many moles of gas do I have?

$PV=nRT$

$n=\frac{PV}{RT}=\frac{0.5\,atm\cdot 25\,L}{0.0821\,\frac{atm\cdot L}{mol\cdot K}\cdot 300\,K}$

$n=0.5075\,mol$

7) If I have 21 moles of gas held at a pressure of 78 atm and a temperature of 900 K, what is the volume of the gas?

$PV = nRT$

$V = \frac{nRT}{P} = \frac{21\ mol \cdot 0.0821 \frac{atm \cdot L}{mol \cdot K} \cdot 900\ K}{78\ atm}$

$V = 19.89\ L$

8) If I have 1.9 moles of gas held at a pressure of 5 atm and in a container with a volume of 50 liters, what is the temperature of the gas?

$PV = nRT$

$T = \frac{PV}{nR} = \frac{5\ atm \cdot 50\ L}{1.9\ mol \cdot .0821 \frac{atm \cdot L}{mol \cdot K}}$

$T = 1602.67\ K$

9) If I have 2.4 moles of gas held at a temperature of 97 $^0$C and in a container with a volume of 45 liters, what is the pressure of the gas?

$PV = nRT$

$P = \frac{nRT}{V} = \frac{2.4\ mol \cdot .0821 \frac{atm \cdot L}{mol \cdot K} \cdot 370\ K}{45\ L}$

$P = 1.62\ atm$ or $P = 164.06\ kPa$

10) If I have an unknown quantity of gas held at a temperature of 1195 K in a container with a volume of 25 liters and a pressure of 560 atm, how many moles of gas do I have?

$PV = nRT$

$n = \frac{RT}{PV} = \frac{.0821 \frac{atm \cdot L}{mol \cdot K} \cdot 1195\ K}{560\ atm \cdot 25\ L}$

$n = 0.007008\ mol$

11) If I have 0.275 moles of gas at a temperature of 75 K and a pressure of 1.75 atmospheres, what is the volume of the gas?

$PV = nRT$

$V = \frac{nRT}{P} = \frac{.275\ mol \cdot .0821 \frac{atm \cdot L}{mol \cdot K} \cdot 75\ K}{1.75\ atm}$

$V = 0.9676\ L$

12) If I have 72 liters of gas held at a pressure of 3.4 atm and a temperature of 225 K, how many moles of gas do I have?

$PV = nRT$

$n = \frac{RT}{PV} = \frac{.0821 \frac{atm \cdot L}{mol \cdot K} \cdot 225\ K}{72\ L \cdot 3.4\ atm}$

$n = 0.07546\ mol$