Bair Stuff Cheat Sheet

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STP

STP=1atm,0degrees celsius
Standard Temperature and Pressure

1 mol

1mol=6.02x10^23particles
X=molar mass(g) X
particles {
atoms(single elements),
molecules(two or more non metals),
formulas units(two or more non metals)(f.u)
ions(minerals, electrolytes,charged particles
}

Conversion: inch to mm

1in=2.54cm
100cm=1m
1m=1,000mm

Conversion: atm to mmHg

1atm=kPa=760torr=10.3mH2O=14.7psi=760mmHg

Things to know about mols

1mol=6.02x10^{23}particles
1mol=22.4L (only for gases)

Constants for Energy

Constants
h= 6.63x10^{-34}**J*s**
c=3x10^{8} **m/s**
h is Planck's Constant
c is speed of light

electron configuration

1s
2s 2p
3s 3p 3d
4s 4p 4d 4f
5s 5p 5d 5f
6s 6p 6d 6f
7s 7p 7d 7f
s=2 p=6 d=10 f=14

Rules for Sig Figs

To determine the number of significant figures in a number use the following 3 rules:
1.Non-zero digits are always significant
2.Any zeros between two significant digits are significant
3.A final zero or trailing zeros in the decimal portion ONLY are significant
Example: .500 or .632000 the zeros are significant
.006 or .000968 the zeros are NOT significant
For addition and subtraction use the following rules:
1.Count the number of significant figures in the decimal portion ONLY of each number in the problem
2.Add or subtract in the normal fashion

Rules for Sig Figs (cont)

3.Your final answer may have no more significant figures to the right of the decimal than the LEAST number of significant figures in any number in the problem.
For multiplication and division use the following rule:
1.The LEAST number of significant figures in any number of the problem determines the number of significant figures in the answer. (You are now looking at the entire number, not just the decimal portion)
This means you have to be able to recognize significant figures in order to use this rule
Example: 5.26 has 3 significant figures
6.1 has 2 significant figures

No think math method? for conversion

#$unit^{1}$ x #unit(converting to) / #$unit^{1}$
#=number
cancel like units
then multiple and divide then you get your answer **with new units**

Abbreviations

Atmosphere-atm
Bar-Bar
millimeter of mercury-mmHg
Pascal-pa
Pounds per square inch-psi
Torr-torr

Celsius to Kelvin

K=°C+273.15

The 7 Diatomic Elements

Hydrogen (H2)
Nitrogen (N2)
Oxygen (O2)
Fluorine (F2)
Chlorine (Cl2)
Iodine (I2)
Bromine (Br2)

Useful things to know about gases

1. Gas particles are much farther apart from each other than liquid and solid particles
2. Gases are fluids, fluids are any substance that can flow
3. Gases have low density
4. Gases are highly compressible
5. Gases completely fill a container
6. Kinetic molecular theory *model used to predict gas behavior

Useful things to know about gases (cont)

*constant random motion, increasing temp, increases motion
7. Intermolecular forces(attractive forces) are very weak or nonexistent between gas particles

number prefixes

1-mono
2-di
3-tri
4-tetra
5-penta
6-hexa
7-hepta
8-octa
9-nona
10-deca

mole of a photon

$(6.02x10^{23})(6.63x10^{-34})(V)$
Multiply this exactly how this is once you get your **V** and you will get your mole of a photon for the problem.

Energy Conversions

$1m=1x10^9nm$
$1kHz=1x10^3Hz$
$1mHz=1x10^6Hz$

Energy Formulas

C=VA **(A is lambda)**
E=hV
E is energy
V is frequency
A is lambda

Combined gas Law

$P^1V^1/T^1=P^2V^2/T^2$
The Combined Gas Law is useful when: **Given two pressures, volumes, or temperatures and asked for an unknown pressure, volume, or temp**. Whenever it gives you conditions for one gas, and asks for conditions of another gas, you're most likely going to use this Law.

Charle's law

$v^1/t^1 = v^2/t^2$
Since pressure is kept constant, the only variable that is manipulated is temperature. This means that we can use Charles's law in **order to compare volume and temperature**. Since volume and temperature are on opposite sides of the ideal gas law, they are directly proportional to one another.

Ideal gas Law

PV/*n*T=*n*RT/*n*T
P=atm
V=L
n=# of mols
T=Kelvin
R= 0.0821 atm x L / mol x K --- Always divide the numbers underneath

Boyles law

$P^1V^1 = P^2V^2$
Key Points:
~According to Boyle's Law, an inverse relationship exists between pressure and volume.
~Boyle's Law holds true only if the number of molecules (n) and the temperature (T) are both constant.
~Boyle's Law is used to predict the result of introducing a change in volume and pressure only, and only to the initial state of a fixed quantity of gas.
~The relationship for Boyle's Law can be expressed as follows: P1V1 = P2V2, where P1 and V1 are the initial pressure and volume values, and P2 and V2 are the values of the pressure and volume of the gas after change.

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Gay-lusacs law

$p^1/t^1 = p^2/t^2$
Gay-Lussac's law is a form of the ideal gas law in which gas volume is kept constant. When volume is held constant, pressure of a gas is directly proportional to its temperature. The usual equations for Gay-Lussac's law are P/T = constant or Pi/Ti = Pf/Tf.