**General Chemistry I Equations & Info**

** Significant Figures: **
1) Any non-zero number is significant (1-9)
2) Any zero between two non-zero numbers is significant (203)
3) Any zero to the right of a non-zero and to the left of a decimal is significant (100.)
4) Any zero to the right of a non-zero and a decimal is significant (1.00)
5) Any zero to the left of a non-zero is not significant (0.001 or 01.)

×/± number of significant figures is dependent of smallest number of significant figures of products. (25×5=125⇒100) +/- number of significant figures dependent of smallest number of decimal places of added or subtracted numbers. (1.0+0.05+2.002=3.052⇒3.1)

** Mole Web:**

(A) and (B) are any compounds in the Chemical Equation.
PT-Find molar mass from periodic table.
AC-Avagadros’s Constant: $(6.02*10^{23}$ molecules/mole)

** ICE Table:**
I-initial number of moles
Δ-the change in moles
E-end number of moles

Ex: If you start with 20 moles of $\text{Li}_2\text{O}$ and 15 moles of $\text{BeCl}_2$, how much $\text{BeO}$ and $\text{LiCl}$ will you end up with?

<table>
<thead>
<tr>
<th></th>
<th>$\text{Li}_2\text{O}$</th>
<th>$\text{BeCl}_2$</th>
<th>$\text{BeO}$</th>
<th>$\text{LiCl}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>20</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Change</td>
<td>-15</td>
<td>-15</td>
<td>+15</td>
<td>+30</td>
</tr>
<tr>
<td>Ending</td>
<td>5</td>
<td>0</td>
<td>15</td>
<td>30</td>
</tr>
</tbody>
</table>

So for the above reaction, when you start with 20 moles of $\text{Li}_2\text{O}$ and 15 moles of $\text{BeCl}_2$, you end up with 5 moles of $\text{Li}_2\text{O}$, 15 moles of $\text{BeO}$, and 30 moles of $\text{LiCl}$. $\text{BeCl}_2$ was the Limiting Reagent.

** General Naming of Compounds:**
(ionic) Metal - Non-Metal
(no prefix)Metal name (no prefix)Non-Metal Name(ide)

$\text{Li}_2\text{O}$ Lithium Oxide
$\text{MgCl}_2$ Magnesium Chloride

(Covalent) Non-Metal – Non-Metal
(prefix except Mono)1$^{st}$ Non-Metal (Prefix)2$^{nd}$ Non-Metal(ide)

$\text{H}_2\text{O}$ Dihydrogen Monoxide
$\text{N}_2\text{O}_3$ Dinitrogen Trioxide
$\text{SCl}_2$ Sulfur Dichloride

** Ideal Gas Law:** $PV=nRT$

P: pressure (usually atm)
V: volume (L)
n: number of moles
R: (a constant that varies with units used) $0.082 \text{L*atm or 0.008314 kJ mole*K mole*K}$
T: temperature (K)

1 mole of any gas takes up 22.5 L of space at STP.


** Dilutions:** $C_1V_1 = C_2V_2$
$C_1V_1 + C_2V_2 = C_1V_1$
C = concentration (M) of a solution
V = volume (L) of the container the solution is in

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**Percent Yield** = \[
\frac{\text{Actual Yield}}{\text{Theoretical Yield}}\] \times 100%

**Percent Error** = \[
\frac{|\text{measured value-accepted value}|}{\text{accepted value}}\] \times 100%

**Molarity** = \[
\frac{\text{moles solute}}{1 \text{L solution}}
\]

**Molality** = \[
\frac{\text{moles of solute}}{\text{volume (kg) solvent}}
\]

**Mole Fraction** = \[
\frac{\text{moles (A)}}{\text{moles (A)} + \text{moles (B)} + \ldots}
\]

**Mass Percent** = \[
\frac{\text{mass (A)}}{\text{total mass}}\] \times 100%
Energy/Heat used/released to Change Phase

q=m*C*ΔT

Heat of Reaction:

q=Energy/Heat (J or kJ)
m=mass (g or kg)
ΔT=Change in Temperature (K)
ΔT = T_f – T_i
T_f=Final Temperature (K)
T_i=Initial Temperature (K)

(2) For Water (H\textsubscript{2}O)

C\textsubscript{solid water} = 2.11 J/(g*K)
C\textsubscript{liquid water} = 4.22 J/(g*K)
C\textsubscript{water vapor} = 2.08 J/(g*K)

Density Equations:

D = \frac{m*P}{R*T} \\
D=Density (g/L) \\
m=molar mass (g/mole) \\
P=Pressure (atm) \\
R=constant ((L*atm)/(mole*K)) \\
T=Temperature (K)

Pressure Conversions:

(1) 1 atm = 1.01295 bar = 101,295 pascals (pa)

Sections of this handout were comprised from the following sources.


Created By: Chris Schoenike