

## Mr. Bausback's Chemistry Reference Sheet

### Formulas

**Ideal Gas Law:**  $PV = nRT$        $\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2}$

**Dalton's Law:**  $P_{total} = P_A + P_B + P_C + \dots$

**Temperature:**  $K = ^\circ C + 273$

$^{\circ}C = 0.56(^{\circ}F - 32)$      $^{\circ}F = 1.8 \times ^{\circ}C + 32$

**H<sup>+</sup> Concentration:**

$pH = -\log[H^+]$        $K_w = [H^+][OH^-] = 10^{-14}$

**Freezing (and Boiling) Point Depression:**  $\Delta T_f = mK_f i$

**Calorimeters:**  $q = m \times C_p \times \Delta T$

**Thermodynamics:**  $\Delta G = \Delta H - T\Delta S$      $\Delta G^{\circ} = -RT \ln K$

**Energy & Light:**  $E = mc^2$      $E = h\nu = hc/\lambda$      $c = \lambda\nu$

**Concentration:** M = mols solute/L soln    m = mols solute/Kg solvent

### Constants

**At STP:**  $1 atm, 0^{\circ}C$        $1 mol gas = 22.4 L$

**Pressure:**  $1 atm = 760 mmHg(torr) = 14.7 psi = 101.3 kPa$

**Gas Constant:**  $R = 0.0821 \frac{L \times atm}{mol \times K} = 8.31 \frac{J}{mol \times K}$

**In water:**  $K_f = 1.86^{\circ}C/m$      $K_b = 0.512^{\circ}C/m$

**Energy:**  $4.184 J = 1 cal$

**Specific Heat of Water:**  $C_p = 4.184 J/g^{\circ}C$

**Speed of light in a vacuum:**  $c = 3.00 \times 10^8 m/s$

**Planck's Constant:**  $h = 6.63 \times 10^{-34} Js$

**Density of water:**  $1.0 g = 1.0 mL = 1.0 cm^3$

**Avogadro's Number:**  $1 mol = 6.022 \times 10^{23} molecules$

### Conversions

#### Metric to Metric Conversions

1 km	=	1000 m
100 cm	=	1 m
1000 mm	=	1 m
$10^9$ nm	=	1 m
1 cm <sup>3</sup>	=	1 mL
1000 mL	=	1 L
1000 g	=	1 kg
1000 mg	=	1 g
$10^9$ ng	=	1 g

#### English to English Conversions

1 lb	=	16 oz
1 quart	=	4 cups
1 pint	=	2 cups

#### English to Metric Conversions

1 mile	=	1.609 km
1 in	=	2.54 cm
1 m	=	39.37 in
1 ft <sup>3</sup>	=	28.32 L
1 L	=	1.057 qt
1 lb	=	453.6 g
1 g	=	0.03527 oz

#### English to English Conversions

1 ft	=	12 in
1 yd	=	3 ft
1 mile	=	5280 ft
1 gallon	=	4 qt

### Polyatomic Ions

ammonium	NH <sub>4</sub> <sup>+</sup>	bisulfite (hydrogen sulfite)	HSO <sub>3</sub> <sup>-</sup>
nitrate	NO <sub>3</sub> <sup>-</sup>	hydrogen phosphate	HPO <sub>4</sub> <sup>2-</sup>
sulfate	SO <sub>4</sub> <sup>2-</sup>	dihydrogen phosphate	H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>
phosphate	PO <sub>4</sub> <sup>3-</sup>	phosphite	PO <sub>3</sub> <sup>3-</sup>
carbonate	CO <sub>3</sub> <sup>2-</sup>	bicarbonate (hydrogen carbonate)	HCO <sub>3</sub> <sup>-</sup>
hydroxide	OH <sup>-</sup>	oxalate	C <sub>2</sub> O <sub>4</sub> <sup>2-</sup>
chromate	CrO <sub>4</sub> <sup>2-</sup>	acetate	C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup>
dichromate	Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup>	cyanide	CN <sup>-</sup>
nitrite	NO <sub>2</sub> <sup>-</sup>	perchlorate	ClO <sub>4</sub> <sup>-</sup>
hypochlorite	ClO <sup>-</sup>	chlorate	ClO <sub>3</sub> <sup>-</sup>
sulfite	SO <sub>3</sub> <sup>2-</sup>	bisulfate (hydrogen sulfate)	HSO <sub>4</sub> <sup>-</sup>
permanganate	MnO <sub>4</sub> <sup>-</sup>	chlorite	ClO <sub>2</sub> <sup>-</sup>

