

Chemistry Reference Sheet

		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18																																																																																																																																																																																																														
		1A		2A		3B		4B		5B		6B		7B		8B						1B		2B		3A		4A		5A		6A		7A		8A																																																																																																																																																																																																														
1	1	H Hydrogen 1.01	2	He Helium 4.00	3	Li Lithium 6.94	4	Be Beryllium 9.01	5	B Boron 10.81	6	C Carbon 12.01	7	N Nitrogen 14.01	8	O Oxygen 16.00	9	F Fluorine 19.00	10	Ne Neon 20.18	11	Na Sodium 22.99	12	Mg Magnesium 24.31	13	Al Aluminum 26.98	14	Si Silicon 28.09	15	P Phosphorus 30.97	16	S Sulfur 32.07	17	Cl Chlorine 35.45	18	Ar Argon 39.95	19	K Potassium 39.10	20	Ca Calcium 40.08	21	Sc Scandium 44.96	22	Ti Titanium 47.87	23	V Vanadium 50.94	24	Cr Chromium 52.00	25	Mn Manganese 54.94	26	Fe Iron 55.85	27	Co Cobalt 58.93	28	Ni Nickel 58.69	29	Cu Copper 63.55	30	Zn Zinc 65.39	31	Ga Gallium 69.72	32	Ge Germanium 72.61	33	As Arsenic 74.92	34	Se Selenium 78.96	35	Br Bromine 79.90	36	Kr Krypton 83.80	37	Rb Rubidium 85.47	38	Sr Strontium 87.62	39	Y Yttrium 88.91	40	Zr Zirconium 91.22	41	Nb Niobium 92.91	42	Mo Molybdenum 95.94	43	Tc Technetium (98)	44	Ru Ruthenium 101.07	45	Rh Rhodium 102.91	46	Pd Palladium 106.42	47	Ag Silver 107.87	48	Cd Cadmium 112.41	49	In Indium 114.82	50	Sn Tin 118.71	51	Sb Antimony 121.76	52	Te Tellurium 127.60	53	I Iodine 126.90	54	Xe Xenon 131.29	55	Cs Cesium 132.91	56	Ba Barium 137.33	57	La Lanthanum 138.91	58	Ce Cerium 140.12	59	Pr Praseodymium 140.91	60	Nd Neodymium 144.24	61	Pm Promethium (145)	62	Sm Samarium 150.36	63	Eu Europium 151.96	64	Gd Gadolinium 157.25	65	Tb Terbium 158.93	66	Dy Dysprosium 162.50	67	Ho Holmium 164.93	68	Er Erbium 167.26	69	Tm Thulium 168.93	70	Yb Ytterbium 173.04	71	Lu Lutetium 174.97	87	Fr Francium (223)	88	Ra Radium (226)	89	Ac Actinium (227)	90	Th Thorium 232.04	91	Pa Protactinium 231.04	92	U Uranium 238.03	93	Np Neptunium (237)	94	Pu Plutonium (244)	95	Am Americium (243)	96	Cm Curium (247)	97	Bk Berkelium (247)	98	Cf Californium (251)	99	Es Einsteinium (252)	100	Fm Fermium (257)	101	Md Mendelevium (258)	102	No Nobelium (259)	103	Lr Lawrencium (262)	85	At Astatine (210)	86	Rn Radon (222)	87	Fr Francium (223)	88	Ra Radium (226)	89	Ac Actinium (227)	90	Th Thorium (232)	91	Pa Protactinium (231)	92	U Uranium (238)	93	Np Neptunium (237)	94	Pu Plutonium (244)	95	Am Americium (243)	96	Cm Curium (247)	97	Bk Berkelium (247)	98	Cf Californium (251)	99	Es Einsteinium (252)	100	Fm Fermium (257)	101	Md Mendelevium (258)	102	No Nobelium (259)	103	Lr Lawrencium (262)	81	Tl Thallium 204.38	82	Pb Lead 207.2	83	Bi Bismuth 208.98	84	Po Polonium (209)	85	At Astatine (210)	86	Rn Radon (222)	111	Rg Roentgenium (280)	112	Cn Copernicium (285)	113	Nh Nihonium (286)	114	Fl Flerovium (289)	115	Mc Moscovium (289)	116	Lv Livermorium (293)	117	Ts Tennessine (294)	118	Og Oganesson (294)

Key

11	—	Atomic number
Na	—	Element symbol
Sodium	—	Element name
22.99	—	Average atomic mass*

* If this number is in parentheses, then it refers to the atomic mass of the most stable isotope.

DOUGHERTY VALLEY HS CHEMISTRY EQUATIONS AND CONSTANTS

EQUILIBRIUM and ACID BASE

$$K_C = \frac{[C]^C [D]^D}{[A]^A [B]^B} \quad K_p = \frac{(P_C)^C (P_D)^D}{(P_A)^A (P_B)^B}$$

$$K_a = \frac{[H^+][A^-]}{[HA]}; \quad K_b = \frac{[OH^-][HB^+]}{[B]}$$

$$K_w = [H^+][OH^-] \quad K_w = K_a \times K_b$$

$$pH = -\log[H^+], \quad pOH = -\log[OH^-]$$

$$14 = pH + pOH$$

Equilibrium Constant:

$$K_w = 1.0 \times 10^{-14} \text{ at } 25^\circ\text{C}$$

THERMOCHEMISTRY

No Phase Change: $q = mc\Delta T$

Phase Change: $q = m \times \Delta H_{fus}$ (or $q = mL_{fus}$)
 $q = m \times \Delta H_{vap}$ (or $q = mL_{vap}$)

Calorimetry: $q_{object\ 1} = -q_{object\ 2}$

Specific Heats:

$$\text{Water} = 4.184 \frac{J}{g^\circ C}$$

$$\text{Steam} = 1.87 \frac{J}{g^\circ C}$$

$$\text{Ice} = 2.09 \frac{J}{g^\circ C}$$

Latent Heats:

$$\text{Fusion} = 334 \frac{J}{g}$$

$$\text{Vaporization} = 2260 \frac{J}{g}$$

Energy Conversion:

$$1 \text{ cal} = 4.184 \text{ J}$$

GASES

Ideal Gas Law: $PV = nRT$

Combined Gas Law: $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

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

Molar Mass: $M = \frac{mRT}{PV}$ $n = \frac{m}{M}$

Gas Density: $D = \frac{MP}{RT}$

Kinetic Energy: $KE = \frac{1}{2}mv^2$

Temperature Conversion: $Kelvin = ^\circ C + 273K$

Volume of Ideal Gas at STP: $22.42 \frac{L}{mol}$

Ideal Gas Constants:

$$= 8.314 \frac{L \cdot kPa}{K \cdot mol}$$

$$= 0.0821 \frac{L \cdot atm}{K \cdot mol}$$

$$= 62.4 \frac{L \cdot mmHg}{K \cdot mol}$$

Pressure Conversions:

$$1 \text{ atm} = 760 \text{ mm Hg}$$

$$= 760 \text{ torr}$$

$$= 101,325 \text{ Pa}$$

$$= 101.3 \text{ kPa}$$

$$= 14.7 \frac{lbs}{in^2}$$

SOLUTIONS

Molarity: $M = \frac{\text{mole solute}}{\text{Liters of solution}}$

Mass Percent: $\% = \frac{\text{mass solute}}{\text{mass solute} + \text{mass solvent}}$

Mole Fraction: $\chi_A = \frac{\text{mol}_A \text{ solute}}{\text{mol}_A \text{ solute} + \text{mol solvent}}$

ENTHALPY

$$\Delta H_{Bonds} = \Sigma Bonds_{Broken} - \Sigma Bonds_{Formed}$$

$$\Delta H_{Rxn} = \Sigma \Delta H_{f \text{ Products}} - \Sigma \Delta H_{f \text{ Reactants}}$$