



Present

The Super-Charged World of Chemistry (Part 2)

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I. Thermochemistry

A. Enthalpy

1. exothermic reactions
2. endothermic reactions
3. standard enthalpy
4. Hess's Law

B. Calorimetry

1. heat capacity
2. molar heat capacity
3. specific heat

II. Atomic Structure

A. Quantum Mechanics

1. electron orbitals
 - a. quantum numbers
 - b. types of orbitals
 1. s orbitals

2. p orbitals

3. d orbitals

4. f orbitals

B. Writing Electron Configurations

1. orbital diagrams

III. Chemical Bonding

A. Lewis Structures

1. the Octet Rule
2. exceptions to the Octet Rule

B. Atomic Bonding

1. ionic bonds
2. covalent bonds

C. Bond Energy

Periodic Table of Elements

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 32.06	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 47.90	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 58.71	29 Cu Copper 63.55	30 Zn Zinc 65.38	31 Ga Gallium 69.72	32 Ge Germanium 72.59	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 (99)	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 118.69	51 Sb Antimony 121.75	52 Te Tellurium 127.60	53 I Iodine 126.90	54 Xe Xenon 131.30				
55 Cs Cesium 132.91	56 Ba Barium 137.34	57 La Lanthanum 138.91	72 Hf Hafnium 178.49	73 Ta Tantalum 180.95	74 W Tungsten 183.85	75 Re Rhenium 186.21	76 Os Osmium 190.2	77 Ir Iridium 192.22	78 Pt Platinum 195.09	79 Au Gold 196.97	80 Hg Mercury 200.59	81 Tl Thallium 204.37	82 Pb Lead 207.19	83 Bi Bismuth 208.98	84 Po Polonium (210)	85 At Astatine (210)	86 Rn Radon (222)				
87 Fr Francium (223)	88 Ra Radium (226)	89 Ac Actinium (227)	104 (261)	105 (262)	106 (263)	107 (262)	108 (265)	109 (266)	Names not yet established for these elements												

Lanthanides

Actinides

58 Ce Cerium 140.12	59 Pr Praseodymium 140.91	60 Nd Neodymium 144.24	61 Pm Promethium (147)	62 Sm Samarium 150.35	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 1.01
90 Th Thorium (232)	91 Pa Protactinium (231)	92 U Uranium (238)	93 Np Neptunium (237)	94 Pu Plutonium (242)	95 Am Americium (243)	96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (251)	99 Es Einsteinium (254)	100 Fm Fermium (257)	101 Md Mendelevium (258)	102 No Nobelium (259)	103 Lr Lawrencium (260)

PART 2

Formulas:

Metric System Prefixes:

10^{-15}	femto	one quadrillionth (f)
10^{-12}	pico	one trillionth (p)
10^{-9}	nano	one billionth (n)
10^{-6}	micro	one millionth (u)
10^{-3}	milli	one thousandth (m)
10^{-2}	centi	one hundredth (c)
10^3	kilo	one thousand times
10^6	mega	one million times
10^9	giga	one billion times
10^{12}	tera	one trillion times

SI Units:

<u>Quantity Measured</u>	<u>Symbol of Unit</u>	<u>Name of Unit</u>
Length	m	Meter
Mass	kg	Kilogram
Time	s	Second
Temperature	K	Kelvin
Volume	L	Liters
Heat	J	Joule
Amount of a Substance	mol	Mole

Conversion from Celsius to Kelvins:

$$K = ^\circ C + 273.15$$

enthalpy of a reaction:

$$\Delta H_{\text{reaction}} = H_{\text{products}} - H_{\text{reactants}}$$

H_{products} = sum of enthalpies of products in the reaction

$H_{\text{reactants}}$ = sum of enthalpies of reactants in the reaction

$$\Delta H^{\circ}_{\text{reaction}} = \sum \Delta H^{\circ}_{f(\text{products})} - \sum \Delta H^{\circ}_{f(\text{reactants})}$$

Note: Σ = sum of

Calculating quantities of heat:

$$q(\text{heat}) = \Delta t(\text{temperature}) \times \text{mass} \times \text{specific heat}$$

Letters representing the l quantum number:

if l equals	0	1	2	3
use the letter	s	p	d	f

Conversion of grams to moles:

long formula:

$$\text{grams to moles} = \frac{1 \text{ mole of substance}}{\text{weight in grams of 1 mole of substance}} \times \text{weight of sample in grams}$$

simple formula:

$$\text{grams to moles} = \frac{\text{weight of sample in grams}}{\text{weight in grams of 1 mole of substance}}$$

Bond energy:

$$\text{bond order} = \frac{1}{2}(\text{number of bonding electrons} - \text{number of anti-bonding electrons})$$