

APPENDIX 2.2 ROOT WORDS USED FREQUENTLY IN CHEMISTRY

<i>root</i>		<i>meaning</i>	<i>example</i>	<i>explanation</i>
<i>-ane</i>	-	single covalent bond	alkane, propane	alkanes have only single bonds
<i>-ene</i>	-	double covalent bond	alkene, polypropylene	alkenes have one or more double bonds
<i>-ion</i>	L	process	fusion	the process of combining or fusing nuclei to form a heavier nucleus
<i>-oid</i>	G	like, form	metalloid	some properties are like those of metals
<i>-yne</i>	-	triple covalent bond	alkyne, ethyne	alkynes have one or more triple bonds
<i>-meter</i>	G	measure	calorimeter	measures heats of reactions
<i>a-</i>	G	not, without	amorphous carbon	carbon without crystalline shape
<i>acid</i>	L	sour, sharp	hydrochloric acid	acids stimulate the sour taste buds
<i>alkali</i>	Ar	soda ash, alkali	alkali lake	alkali lakes have very high mineral content
<i>allo, -io</i>	G	other, different	allotrope	one of the two or more forms of an element that have the same physical state
<i>alpha</i>	G	1st letter of Greek alphabet	alpha particle	designated by the letter "alpha"
<i>amin</i>	N	ammonia	amine, amino acid	an ammonia base in which one or more of the three hydrogens is replaced by an alkyl group
<i>amph, -i, -o</i>	G	double, on both sides	amphoteric, amphibian	amphoteric species react either as acids or bases
<i>anti</i>	G	against, opposite	antiseptic	substance that works against microbes
<i>aqua</i>	L	water	aqueous solution	water based solution
<i>baro</i>	G	pressure	barometer, bar	barometer measures pressure
<i>beta</i>	G	second letter of Greek alphabet	beta particle	designated by the letter beta
<i>bi</i>	L	two	binary compounds	compound made of two elements
<i>bio</i>	G	life	biochemistry	chemistry of living systems
<i>carb, -o, -on</i>	L	coal, carbon	carbohydrate	compound made of carbon, hydrogen, and oxygen (CH ₂ O) _n
<i>chem</i>	G	chemistry	chemical kinetics	the kinetics of a chemical reaction
<i>co, -l, m, -n</i>	L	with, together	coefficient, colligative	number that appears with a formula in a chemical equation
<i>com</i>	L	with, together	composition reaction	A reaction in which molecules are assembled
<i>conjug</i>	L	joined together	conjugate acid, conjugal	acid formed from its conjugate base by the addition of a proton
<i>cosm, -o</i>	G	the world or universe	cosmic rays, cosmos	high energy rays from space (the cosmos)
<i>cry, -mo, -o</i>	G	cold	crystal	crystals form when solutions are cooled
<i>de</i>	L	down, without, from	decomposition, denature, dehydrate	a reaction in which materials are broken down

		from	denature, dehydrate	
<i>dens</i>	L	thick	density, dense	density is a measure of how "thick" a fluid is (how much mass per unit volume)
<i>di</i>	G	separate, double, across,	disaccharide	two monosaccharides tied together
<i>dis</i>	G	separate, apart	dissociation	separation of ions when dissolving
<i>duc, -t</i>	L	lead	ductile	able to be pulled or led through a small opening to produce a wire
<i>e</i>	L	out, without, from	evaporation	the process of vapor leaving from
<i>ef</i>	L	out, from, away	effervescence	rapid escape of gas from a liquid in which it is dissolved
<i>electr, -i, -o</i>	G	electrode	electrolyte	dissolves in water to give a solution that conducts an electric current
<i>elem</i>	L	basic	elements	can't be broken down into more basic substances by normal chemical means
<i>empir, -o</i>	G	experienced	empirical	based upon experience or observation
<i>en</i>	G	in, into	endothermic	a reaction which takes in heat
<i>equ</i>	L	equal	equilibrium	a dynamic condition in which two opposing reactions occur at equal rates
<i>erg</i>	G	work	energy, erg	energy is the ability to perform work
<i>exo</i>	G	out, outside, without	exothermic	exothermic reactions give heat to the outside environment
<i>ferr, -o</i>	L	iron	ferromagnetism	strongly attracted to a magnet, like iron
<i>fiss, -i, -ur</i>	L	cleft, split	fission	the splitting of nuclei
<i>flu</i>	L	flow	fluids	gases and liquids are fluids because they flow
<i>fract</i>	L	break, broken	fractional distillation	distillation in which the components of a mixture are "broken down" and separated by different boiling points
<i>gamma</i>	G	3rd letter of the Greek alphabet	gamma rays	high energy electromagnetic waves identified by the Greek letter gamma
<i>gen</i>	G	bear, produce, beginning	gene	a section of a DNA chain that codes for a particular protein that the organism can produce
<i>glyc, -er, -o</i>	G	sweet	glycogen, glycolysis, glycolipid	a sugar (glucose) based polymer that stores energy in animals
<i>graph, -o, -y</i>	G	write, writing	graphite	form of carbon used in pencils
<i>halo-</i>	G	salt	halogens	halogens (e.g. F, Cl, Br) are often found in salts (e.g. NaF, NaCl, KBr)
<i>hetero-</i>	G	other, different	heterogeneous mixture	a mixture in which properties and composition differ from point to point
<i>hom, eo, -o</i>	G	same, alike	homogeneous mixture	a mixture in which properties and composition are the same throughout
<i>hybrid</i>	L	a mongrel, hybrid, combination	hybrid orbital	orbitals produced by the combination of two or more orbitals of the same atom.
<i>hydr, -a, -i, -o</i>	G	water	hydrolysis	the breaking of bonds using water.
<i>hyper</i>	G	over, above, excessive	(hy)perchloric acid	the oxidation state of chlorine in perchloric acid is above what it is in chloric acid

		excessive		acid is above what it is in chloric acid.
<i>hypo</i>	G	under, beneath	hypochlorous acid	the oxidation state of chlorine in hypochlorous acid is below the oxidation state of chlorine in chlorous acid
<i>im</i>	L	not	immiscible	not mutually soluble (not miscible)
<i>in</i>	L	in, into	intrinsic physical properties	properties inherent to a substance, and not upon the amount present
<i>iso</i>	G	equal	isomers	compounds that have the same molecular formula, but different structures
<i>kilo</i>	G	thousand	kilogram	1000 grams
<i>kine</i>	G	move, moving, movement	kinetic energy	energy of motion
<i>lip, -o</i>	G	fat	lipoprotein	fatty acid combined with protein
<i>liqu, -e, -i</i>	L	fluid, liquid	liquefy	the process of becoming a liquid
<i>lys, -io, -is, -io</i>	G	loose, loosening, breaking	hydrolysis	the breaking apart of a substance by an electric current
<i>macr, -o</i>	G	large, long	macromolecule	macromolecules are large organic molecules
<i>malle, -o, -us</i>	L	hammer	malleable	ability to bend and shape when hit by a hammer
<i>mer, -e, -i, -o</i>	G	a part	dimer	made of two parts
<i>met, -a</i>	G	between, change	metabolism	reactions that change biochemicals from one form to another
<i>meter</i>	G	measure	calorimeter	measures heat energy (calories)
<i>mill -e, -i, -o</i>	L	one thousand	milliliter	one thousandth of a liter
<i>misc</i>	L	mix	miscible	when two solvents dissolve (mix evenly) in each other
<i>mon -a, -er, -o</i>	G	single, one	monomer	single molecular units that can join to form a polymer
<i>morph, -a, -o</i>	G	form	amorphous sulfur	sulfur without definite crystals or shape
<i>neo</i>	G	new, recent	neoprene	a synthetic (new) rubber
<i>neutr</i>	L	neither	neutral	neither positive nor negative
<i>nom, -en, -in</i>	G	name	nomenclature	system of assigning names
<i>non</i>	L	not, ninth	nonpolar	does not have polar characteristics
<i>nuc, -ell, -i</i>	L	nut, center	nucleus	center of the atom
<i>oct, -i, -o</i>	L	eight	octet rule	tendency to acquire a total of 8 electrons in highest energy level
<i>orbi, -t, to</i>	L	circle	orbital	electrons travel around the nucleus in patterns known as orbitals
<i>oxid</i>	F	oxygen	oxide	compound containing oxide ion
<i>photo</i>		light	photochemical smog	air pollutants transformed by sunlight
<i>polar, -i</i>	L	of the pole, polarity	polar covalent	one pole of the bond has a more negative character, and the other a more positive character
<i>poly</i>	G	many	polymer	many molecules bound together to make a new, longer molecule

<i>pro</i>	G	forward, positive, for, in front of	proton	positively charged particle
<i>quant</i>	L	how much	quantum	refers to a discrete amount of energy
<i>radi, -a, -o,</i>	L	spoke, ray, radius	radioactive	produces rays of electromagnetic energy
<i>sacchar, -o</i>	G	sugar	monosaccharide	single sugar unit
<i>sal, -i</i>	L	salt	salinity	referring to the amount of salt in solution
<i>solu-</i>	L	dissolve	solubility	refers to the tendency to dissolve
<i>spect</i>	L	see, look at	spectator ions	ions that "watch" but are not involved in a reaction
<i>super</i>	L	above, over	superheated	retaining liquid properties beyond the normal boiling point
<i>syn</i>	G	together, with	photosynthesis	molecules are put together with energy derived from light.
<i>therm, -o</i>	G	heat	thermochemistry	the study of changes in heat energy accompanying chemical and physical changes
<i>thesis</i>	G	an arranging, statement	hypothesis	a testable statement
<i>tran, -s</i>	L	across, through	transition elements	elements through which you pass when going from the right to left side of the periodic table
<i>un</i>	L	not	unsaturated	bonds that are not saturated
<i>vapor, -i</i>	L	steam, vapor	vaporization	the process of changing a liquid into a vapor
<i>vulcan</i>	L	fire	vulcanized	vulcanized rubber has been treated with heat

APPENDIX 2.3 ETYMOLOGY OF THE NAMES OF THE ELEMENTS

Actinium	Ac	89	1900	Greek: <i>aktis</i> , ray
Aluminum	Al	13	1825	Latin: <i>alumen</i> , substance with astringent taste
Americium	Am	95	1944	English: <i>America</i>
Antimony	Sb	51	1400s	Greek: <i>antimonos</i> , opposite to solitude
Argon	Ar	18	1894	Greek: <i>argos</i> , inactive
Arsenic	As	33	1200s	Greek: <i>arsenikon</i> , valiant
Astatine	At	85	1940	Greek: <i>astatos</i> , unstable
Barium	Ba	56	1808	Greek: <i>barys</i> , heavy
Berkelium	Bk	97	1949	English: University of California <i>Berkeley</i>
Beryllium	Be	4	1797	Greek: <i>beryllos</i> , a mineral
Bismuth	Bi	83	1400s	German: <i>bisemutum</i> , white mass
Boron	B	5	1808	Arabic: <i>bawraq</i> , white, borax
Bromine	Br	35	1826	Greek: <i>bromos</i> , a stench
Cadmium	Cd	48	1817	Latin: <i>cadmia</i> , calamine, a zinc ore
Calcium	Ca	20	1808	Latin: <i>calcis</i> , lime
Californium	Cf	98	1950	English: State and University of <i>California</i>
Carbon	C	6	prehistoric	Latin: <i>carbo</i> , coal
Cerium	Ce	58	1804	English: The asteroid <i>Ceres</i> , discovered 1803
Cesium	Cs	55	1860	Latin: <i>caesius</i> , sky blue
Chlorine	Cl	17	1808	Greek: <i>chloros</i> , grass green
Chromium	Cr	24	1797	Greek: <i>chroma</i> , color
Cobalt	Co	27	1735	Greek: <i>kobolos</i> , a goblin
Copper	Cu	29	prehistoric	Latin: <i>cuprum</i> , copper
Curium	Cm	96	1944	French: Marie & Pierre <i>Curie</i>
Dysprosium	Dy	66	1886	Greek: <i>dysprositos</i> , hard to get at
Einsteinium	Es	99	1952	German: <i>Albert Einstein</i>
Erbium	Er	68	1843	Swedish: <i>Ytterby</i> , town in Sweden where discovered
Europium	Eu	63	1900	English: Europe
Fermium	Fm	100	1953	Italian: Enrico <i>Fermi</i>
Fluorine	F	9	1886	Latin: <i>fluere</i> , to flow
Francium	Fr	87	1939	French: <i>France</i>
Gadolinium	Gd	64	1886	Finnish: Johan <i>Gadolin</i> , Finnish chemist
Gallium	Ga	31	1875	Latin: <i>Gaul</i> , or France
Germanium	Ge	32	1886	German: Germany
Gold	Au	79	prehistoric	Anglo-Saxon: for gold; symbol from Latin <i>aurum</i> for gold
Hafnium	Hf	72	1922	Latin: <i>Hafnia</i> , the city of Copenhagen, Denmark
Helium	He	2	1895	Greek: <i>helios</i> , the sun
Holmium	Ho	67	1879	Latin: <i>Holmia</i> , the city Stockholm, Sweden
Hydrogen	H	1	1766	Greek <i>hydro genes</i> , water former
Indium	In	49	1863	Latin: <i>indicum</i> , produces an indigo-blue spectrum line
Iodine	I	53	1811	Greek: <i>iodes</i> , produces a violet-like <i>spectrum line</i>
Iridium	Ir	77	1804	Latin: <i>iris</i> , rainbow
Iron	Fe	26	prehistoric	Anglo Saxon: <i>iren</i> , symbol from Latin <i>ferrum</i>
Krypton	Kr	36	1898	Greek: <i>kryptos</i> , hidden
Lanthanum	La	57	1839	Greek: <i>lanthanien</i> , to be concealed
Lawrencium	Lw	103	1961	English: Earnest <i>Lawrence</i> , inventor of cyclotron
Lead	Pb	82	prehistoric	Anglo Saxon: <i>lead</i> ; symbol from Latin: <i>plumbum</i>
Lithium	Li	3	1817	Greek: <i>lithos</i> , stone
Lutetium	Lu	71	1905	Latin: <i>Lutetia</i> , ancient name of Paris
Magnesium	Mg	12	1774	Latin: <i>magnes</i> , magnet
Mendelevium	Md	101	1955	Russian: Dmitri <i>Mendeleev</i> , devised periodic table
Mercury	Hg	80	prehistoric	Latin: <i>Mercury</i> , messenger; Symbol <i>Hydrargyus</i> , liquid silver
Molybdenum	Mo	42	1782	Greek: <i>molybdos</i> , lead
Neodymium	Nd	60	1885	Greek: <i>neos</i> , new and <i>didymos</i> , twin
Neon	Ne	10	1898	Greek: <i>neos</i> , new

Neptunium	Np	93	1940	English: planet Neptune
Nickel	Ni	28	1750	German: <i>kupfernickel</i> ., false copper
Niobium	Nb	41	1801	Greek: <i>Niobe</i> , mythological daughter of Tantalus
Nitrogen	N	7	1772	Latin: <i>nitro</i> , native soda and <i>gen</i> , born
Nobelium	No	102	1957	Swedish: Alfred <i>Nobel</i> , discoverer of dynamite
Osmium	Os	76	1804	Greek: <i>osme</i> , odor of volatile tetroxide
Oxygen	O	8	1774	Greek: <i>oxys</i> , sharp, and <i>gen</i> , born
Palladium	Pd	46	1803	English: planetoid <i>Pallas</i> , discovered 1801
Phosphorus	P	15	1669	Greek: <i>phosphoros</i> , light bringer
Platinum	Pt	78	1735	Spanish: <i>plata</i> , silver
Plutonium	Pu	94	1940	English: <i>Pluto</i> the planet
Polonium	Po	84	1898	Polish: <i>Poland</i> , country of co-discoverer Marie Curie
Potassium	K	19	1807	English: <i>potash</i> ; symbol Latin <i>kalium</i>
Praseodymium	Pr	59	1885	Greek: <i>Praseos</i> , leek green and <i>didymos</i> , a twin
Promethium	Pm	61	1947	Greek: <i>Prometheus</i> , fire bringer in Greek mythology
Protactinium	Pa	91	1917	Greek: <i>protos</i> first
Radium	Ra	88	1898	Latin: <i>radius</i> , ray
Radon	Rn	86	1900	Latin: comes from <i>radium</i>
Rhenium	Re	75	1924	Latin: <i>Rhenus</i> , Rhine province of Germany
Rhodium	Rh	45	1804	Greek: <i>rhodon</i> , a rose
Rubidium	Rb	37	1860	Latin: <i>rubidus</i> , red
Ruthenium	Ru	44	1845	Latin: <i>Ruthenia</i> , Russia
Samarium	Sm	62	1879	Russian: <i>Samarski</i> , a Russian engineer
Scandium	Sc	21	1879	Scandinavian: <i>Scandinavia</i>
Selenium	Se	34	1817	Greek: <i>selene</i> , moon
Silicon	Si	14	1823	Latin: <i>silex</i> , flint
Silver	Ag	47	prehistoric	Anglo-Saxon, <i>siolf</i> ; symbol Latin: <i>argentum</i>
Sodium	Na	11	1807	Latin: <i>sodanum</i> for headache remedy; symbol Latin: <i>natrium</i>
Strontium	Sr	38	1808	Scottish: town of <i>Strontian</i> , Scotland
Sulfur	S	16	prehistoric	Latin: <i>sulphur</i> , sulfur
Tantalum	Ta	73	1802	Greek: <i>Tantalus</i> of Greek mythology
Technetium	Tc	43	1937	Greek: <i>technetos</i> , artificial
Tellurium	Te	52	1782	Latin: <i>tellus</i> , the earth
Terbium	Tb	65	1843	Swedish: <i>Ytterby</i> , town in Sweden
Thallium	Tl	81	1862	Greek: <i>thallos</i> , a young shoot
Thorium	Th	90	1819	Scandinavian: <i>Thor</i> from Scandinavian mythology
Thulium	Tm	69	1879	Latin: <i>Thule</i> , northerly part of habitable world
Tin	Sn	50	prehistoric	Latin: Etruscan god, <i>Tinia</i> ; symbol Latin: <i>stannum</i>
Titanium	Ti	22	1791	Greek: Greek mythology, <i>Titans</i> first sons of the earth
Tungsten	W	74	1783	Swedish: <i>tung sten</i> , heavy stone, symbol German: <i>worfram</i>
Uranium	U	92	1789	English: Planet <i>Uranus</i>
Vanadium	V	23	1830	Scandinavian: goddess <i>Vanadis</i> of Scandinavian mythology
Xenon	Xe	54	1898	Greek: <i>xenos</i> , strange
Ytterbium	Yb	70	1905	Scandinavian: <i>Ytterby</i> , a town in Sweden
Yttrium	Y	39	1843	Scandinavian: <i>Ytterby</i> , a town in Sweden
Zinc	Zn	30	prehistoric	German: <i>Zink</i> , akin to <i>Zinn</i> , tin
Zirconium	Zr	40	1824	named for the mineral, <i>zircon</i>

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