

Announcements

Wednesday, February 11, 2009

- Ch 4 MasteringChemistry due before class today.
- Ch 5 MC due next week **Tues**, Feb 17 9:45 am.

No class Monday (President's day)

Exam 1 is next week Wed, Feb 18 covering chapters 1-5 (through today's material - no polyatomic ions, only binary compounds).

- Mostly multiple choice, 25-30 mult choice q's
- 1-2 pages of short answer / show your work
- 100 points, 75 minutes
- Study guide will be posted on webpage later today

Optional study/review sessions in lab next week:

- Tues 8am, 1pm, Wed 8am

For practice:

- Practice worksheets on webpage (unit conversion, density, binary naming)
- End-of-chapter problems (odd # answers in back of book)
- Rework MasteringChemistry problems for practice
- Practice multiple choice exams from U of M (they cover through ch 6 on their exam 1)

If you're having trouble:

- See me during my office hours
- See a tutor in the academic support center - bring a problem you're having trouble with
- Work with a friend or study group
- Post a question to the D2L discussions (you need at least 2 posts in Exam 1 discussions before Exam 1)

Type I or Type II?

Type I: fixed charge metal
(most are main-group metals)

Type II: variable charge metal
(most are transition metals)

A few important exceptions...

Periodic Table of the Elements

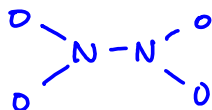
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
IA	IIA	IIIB	IVB	VB	VIB	VII B	VIII B	VIII B	VIII B	IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA	
1 H 1.008																	2 He 4.003	
3 Li ⁺ 6.939	4 Be ²⁺ 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18	
11 Na ⁺ 22.99	12 Mg ²⁺ 24.31											13 Al ³⁺ 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95	
19 K ⁺ 39.10	20 Ca ²⁺ 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn ²⁺ 65.38	31 Ga ³⁺ 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80	
37 Rb ⁺ 85.47	38 Sr ²⁺ 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.96	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.4	47 Ag ⁺ 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.75	52 Te 127.60	53 I 126.90	54 Xe 131.29	
55 Cs ⁺ 132.91	56 Ba ²⁺ 137.33	57-70 * Lu 174.97	71 Hf 178.49	72 Ta 180.95	73 W 183.84	74 Re 186.21	75 Os 190.23	76 Ir 192.22	77 Pt 195.08	78 Au 196.97	79 Hg 200.59	80 Tl 204.38	81 Pb 207.2	82 Bi 208.98	83 Po (209)	84 At (210)	85 Rn (222)	
87 Fr ⁺ (223)	88 Ra ²⁺ (226)	89-102 ** Lr (257)	103 Rf (261)	104 Db (262)	105 Sg (271)	106 Bh (272)	107 Hs (270)	108 Mt (276)	109 Ds (281)	110 Rg (280)	111 Uub (285)	112 Uut (284)	113 Uuq (289)	114 Uup (288)	115 Uuh (292)	116 Uuo (294)	117 Uue (294)	118 Uuo (294)
		57 * La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (147)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04			
		89 ** Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)			

Reference: <http://www.webelements.com>

ZnS Zn²⁺/S²⁻ zinc sulfide PbO₂ Pb⁴⁺/O²⁻ lead(IV) oxide
GaBr₃ Ga³⁺/Br⁻ gallium bromide PbO Pb²⁺/O²⁻ lead(II) oxide

Type III (Molecular) Compounds

Molecular compounds contain nonmetals only and have no ions!



Binary (2 element) molecular compounds are named from the formula using Greek prefixes to show quantity

NO₃: nitrogen trioxide

N₂O₄: dinitrogen tetroxide
(avoid ao, oo)

CO₂: carbon dioxide

NO₂: nitrogen dioxide

CO: carbon monoxide

P₂Cl₅: diphosphorus pentachloride

memorize

Greek prefixes
(for quantity)

1: mono only for 2nd element

2: di

3: tri

4: tetra

5: penta

6: hexa

Binary nomenclature practice

Do you know the difference between the 3 types?

<u>Formula</u>	<u>Type</u>	<u>Ion pair</u>	<u>Name</u>
AlBr ₃	I	Al ³⁺ /Br ⁻	aluminum bromide
FeBr ₃	II	Fe ³⁺ /Br ⁻	iron(III) bromide
BBr ₃	III molecular	no ions	boron tribromide

	type I	type II	type III
ionic or molecular	ionic	ionic	molecular
fixed / var charge	fixed	var charge metal	no ions
simplify ratio?	yes	yes	no NO ₂ N ₂ O ₄ different molecules
naming feature	metal cation + nonmetal -ide	roman num. = pos charge of metal cation	Greek prefixes = number of atoms

<u>Formula</u>	<u>Type</u>	<u>Ion pair</u>	<u>Name/Formula</u>
Mn ₃ N ₇	II	Mn ²⁺ /N ³⁻	manganese(II) nitride
platinum (IV) oxide	II	Pt ⁴⁺ /O ²⁻	PtO ₂
IF ₆	III	no ions	iodine hexafluoride
AuS ₂	II	Au ⁴⁺ /S ²⁻	gold(IV) sulfide

$$\begin{matrix} \square & S^{2-} \\ Au & S^{2-} \end{matrix}$$

$$2(S^{2-}) = 4-$$

$$1(Au^{\square}) = 4+$$

Polyatomic ions

Polyatomic ions are multi-atom ions (charged molecules)

You must have these memorized for quiz 2 (after exam 1)
(Memorize their names, formulas, and charges!)

ammonium	<i>only positive</i>	NH_4^+	<i>(NH₃ = ammonia) neutral molecule</i>
acetate		$\text{C}_2\text{H}_3\text{O}_2^-$	
carbonate		CO_3^{2-}	
hydrogen carbonate (or bicarbonate)		HCO_3^-	
nitrite		NO_2^-	
nitrate		NO_3^-	<i>-ate = 1 more O than -ite</i>
phosphate		PO_4^{3-}	<i>(P³⁻-phosphide)</i>
hydrogen phosphate		HPO_4^{2-}	
hypochlorite		ClO^- (chlorine and oxygen)	
chlorite		ClO_2^-	
chlorate		ClO_3^-	<i>(Cl⁻ chloride) adding H decreases (-) charge by 1</i>
perchlorate		ClO_4^-	
permanganate		MnO_4^-	
sulfite		SO_3^{2-}	<i>(S²⁻-sulfide)</i>
sulfate		SO_4^{2-}	<i>-ide monoatomic ions</i>
hydrogen sulfate (or bisulfate)		HSO_4^-	
hydrogen sulfite (or bisulfite)		HSO_3^-	
chromate		CrO_4^{2-}	
dichromate		$\text{Cr}_2\text{O}_7^{2-}$ *	
cyanide		CN^-	
hydroxide		OH^-	
peroxide		O_2^{2-}	

Fixed-charge transition metals:

zinc Zn^{2+}

silver Ag^+