Answers to Exercise 11.2
Naming Ionic Compounds Containing Oxoanions

1.

(a) SO_4^{2-} , SO_3^{2-}

(b) NO_3^- , NO_2^-

(c) ClO_3^- , ClO_2^- , ClO^-

(d) ClO_3^- , BrO_3^-

(e) BrO_3^- , BrO_4^-

(f) CO_3^{2-} , HCO_3^- , H_2CO_3

(g) SO_4^{2-} , HSO_4^- , H_2SO_4

(h) SO_3^{2-} , HSO_3^- , H_2SO_3

(i) PO_4^{3-} , H_3PO_4

(j) PO_3^{3-} , H_3PO_3

Guidelines for oxoanion and oxoacid nomenclature:

_____ate to _____ite: remove one oxygen; keep the charge the same

_____ite to hypo_____ite: remove one oxygen; keep the charge the same

_____ate to per_____ate: add one oxygen; keep the charge the same

_____ate to hydrogen _____ate (or similar): add H^+
(add one hydrogen and make the charge more positive by one)

_____ate to dihydrogen _____ate (or similar): add two H^+
(add two hydrogen and make the charge more positive by two)

_____ate to _____ic acid: add enough H^+ to neutralize the charge of the anion

_____ite to _____ous acid: add enough H^+ to neutralize the charge of the anion

elements in periods 4+ will tend to form the same oxoanions (same number of oxygen atoms and same charge) as the period 3 element in the same group

e.g. Se and Te behave like S (sulfate is SO_4^{2-}; selenate is SeO_4^{2-}; tellurate is TeO_4^{2-}*)*

elements in periods 4+ will tend to form the same oxoacids (same number of oxygen atoms and same number of hydrogen atoms) as the period 3 element in the same group

e.g. Br and I behave like Cl (chloric acid is $HClO_3$; bromic acid is $HBrO_3$; iodic acid is HIO_3)

2.

(a) iron(II) sulfite

(b) calcium nitrite

(c) chromium(III) perchlorate

(d) lithium hydrogen carbonate *or* lithium bicarbonate

Remember that you need to include Roman numerals to indicate the charges of transition metal cations. Do not include them for the main group metal cations.

Technically, there are a few transition metals that only form one cation under normal circumstances, and Roman numerals are often omitted from names involving those transition metal cations. e.g. scandium(III) sulfate would often just be called scandium sulfate. In CHEM 1000, we have no interest in making you memorize which transition metals fall into this category.

3.

(a) $CoCO_3$

(b) NaOCl *or* NaClO

(c) $Sc_2(SO_4)_3$

(d) KH_2PO_4