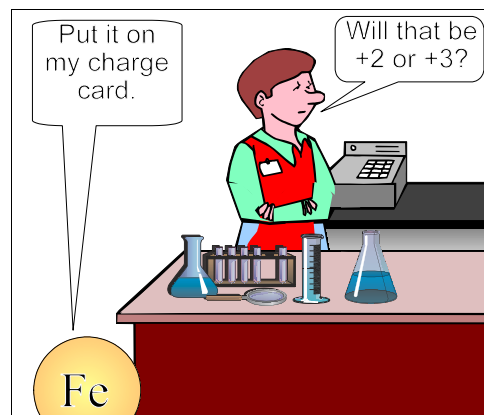


Determining the Charge on a Metal Ion

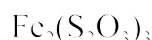
Univalent metal ions, those with only one oxidation state, are named exactly the same as the element (Ba is named barium, and Ba^{+2} is also named barium), but polyvalent metal ions, those with multiple oxidation states, include a roman numeral in the name to indicate the oxidation state (Cu^{+1} is called copper I, while Cu^{+2} is called copper II). In order to name a compound, therefore, it is necessary to check on the *Periodic Table* to see if the metal ion has more than one oxidation state. If it does, it is necessary to figure out what the oxidation state is so the correct roman numeral can be included as part of the name. This can be done as in the following example based on the formula $\text{Fe}_2(\text{S}_2\text{O}_3)_3$.



When ions go shopping

Using the procedures described above and to the left, determine the oxidation states of the metals in each of the compounds listed below.

1. BaCl_2 _____
2. PbO_2 _____
3. MnCl_7 _____
4. $\text{Cr}_3(\text{PO}_4)_2$ _____
5. $\text{Al}_2(\text{SO}_4)_3$ _____
6. Sn_3P_4 _____
7. $\text{Ca}(\text{NO}_3)_2$ _____
8. Cu_2S _____
9. FeO _____
10. $\text{Fe}_2(\text{SO}_4)_3$ _____



ion	Fe	S_2O_3	
subscript	2	3	
oxidation state	+3	-2	TOTAL
total	+6	-6	= 0

STEP 1 (black arrow pointing left to subscript column)
STEP 2 (black arrow pointing left to oxidation state column)
STEP 3 (blue arrow pointing up to -2)
STEP 4 (red arrow pointing up to +6)
STEP 5 (green arrow pointing right to oxidation state column)

Prepare a table as above.

Step 1: List the subscripts for the metal and the nonmetal ions.

Step 2: Look up the oxidation state of the nonmetal ion on the *Periodic Table*.

Step 3: Multiply the oxidation state of the nonmetal by its subscript to get the total charge.

Step 4: Determine the total charge of the metal ions by calculating the number which, when added to the total charge of the nonmetal ion, gives the compound a total charge of zero.

Step 5: Divide the total charge of the metal ions by the subscript of the metal to get the oxidation state.