NS E3 (pg 1 of 1) Formulas for More Ionic Compounds – Using Roman #'s

Name_____________

Hopefully you did your homework and practice by reading NS 4.1 & 4.2 and doing P 4.1 – Binary Ionic Compounds
You would have worked with writing and naming Ionic compounds involving elements in Groups 1, 2, & 3 combining with elements in Groups 5, 6, & 7

So what about the rest of the metals?

So far the discussion has included only some of the metals in the periodic chart, NS 4.2 will to look at the transition metals and the "other six" metals under the staircase ($_{31}Ge$, $_{50}Sn$, $_{51}Sb$, $_{82}Pb$, $_{83}Bi$, $_{84}Po$).
So far the discussion has included only some of the elements in the periodic chart, now its time to look at the transition and heavy metals. You know who the transition metals are, and the heavy metals are the six elements under the nonmetal/metal staircase – Ge, Sn, Sb, Pb, Bi, and Po.

Because these elements are metals, they must lose electrons, but because they have transition metal electrons (those 10 electrons stuffed deep inside) they can lose varying amounts of electrons producing ions that are "sort-of" satisfied.
What to do with an atom such as lead? The presence of transition metal electrons (those 10 electrons stuffed deep inside) in lead cause it to be able to lose either 2 or 4 valence electrons and thus it can form, 2+ & 4+ ions. Since you have no way of predicting which of these two options occurs, the name of a lead chloride compound must give more information or you wouldn't be able to tell which lead ion has formed. That information comes in the form of a Roman Numeral indicating the charge.

The players (atoms)	**The ions they want to form**	**The method these atoms (players) must combine to ensure that the number of electrons transferred satisfies both players (atoms).**	**The resulting chemical formula (the team)**	**The name of the ionic compound**
Pb & Cl	$Pb^{+?}$ Cl^{-}	Without being told the charge on the lead, you would have no way of knowing what charge is formed.		Lead(??) chloride

So you first need to be told it is lead (II) chloride or lead (IV) chloride, so you need the name.
The Roman numeral tells you the + charge on the lead.

The name of the ionic compound	**The players (atoms)**	**The ions they want to form**	**The method these atoms (players) must combine to ensure that the number of electrons transferred satisfies both players (atoms).**	**The resulting chemical formula (the team)**
Lead(II) chloride	Pb & Cl	Pb^{+2} Cl^{-}	Two chlorines (−1 each) needed to satisfy the one lead	$PbCl_2$
Lead(IV) chloride	Pb & Cl	Pb^{4+} Cl^{-}	For lead (IV) chloride the charge on the lead is 4+ thus 4 chlorines are needed to satisfy the	$PbCl_4$
Tin (IV) oxide	Sn & O	Sn^{4+} O^{-2-}	If you criss-cross this time the tin and oxygen would combine as Sn_2O_4 however you must write the chemical formula in the lowest whole number ratio. So reduce and write the formula as shown in the last column.	SnO_2

Working the process "backwards"

This might get tricky when given the formula and asked to determine the correct name.

The correct formula	**The charge on nonmetal**	**The total negative charge**	**must balance the total positive charge**	**The name of the ionic compound**
NiF_3	F^{-}	three F^{-} = −3 total	Since the fluoride carries a 1− charge, 3 of them × 1− equals 3−, and the nickel ions total charge must be opposite in sign, but equal in magnitude, thus Ni must be 3+, resulting in nickel(III) oxide	nickel(III) fluoride
CrP_2	P^{3-}	two P^{3-} = −6	Since the phosphide carries a 3− charge, 1 of them × 2− equals 2−, and the chromium ions total charge must be opposite in sign, but equal in magnitude, thus Cr must be 6+, resulting in chromium(VI) oxide	Chromium (VI) phosphide
Cu_2S	S^{2-}	one S^{2-} is of course a charge of −2	Since the sulfide carries a 2− charge, 1 of them × 2− equals 2−, and the copper ions total charge must be opposite in sign, but equal in magnitude. Thus 2 copper ions × "what charge" = 4+? Thus the copper must be 1+, resulting in copper(I) sulfide	Copper (I) sulfide