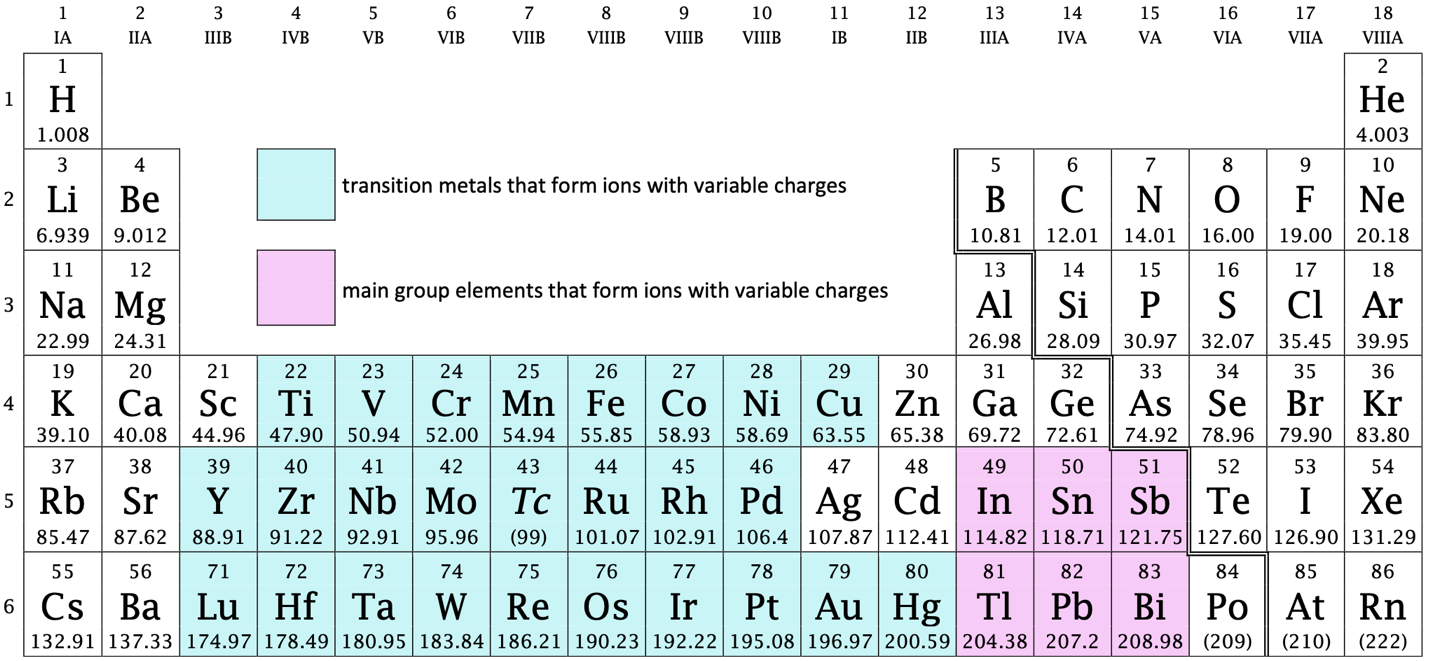
**Foolproof rules for ionic naming/formulas:**

If you’re given the formula, write the name by doing the following:

1. Write the name of the cation and the anion. The cation is the first thing in the formula (usually a metal) and the anion is the rest.
   1. If you don’t know what something is called, try looking at the table of polyatomic ions on the back of the periodic table.
2. Figure out if the name needs a Roman numeral. If the cation is one of the shaded elements in this diagram, it does need a Roman numeral. If it isn’t, you’re done!



1. Calculate the Roman numeral you write between the name of the cation and anion, but ONLY if the cation is one of the shaded areas above.
   1. To do this, find the charge on the anion. This will either be found by counting to the nearest noble gas (if it’s an element) or by looking at the chart on the back of the periodic table (if it’s a polyatomic ion).
   2. Now, figure out how many polyatomic ions you have. If it’s an element, this is the number after the symbol of that element (assume that it’s a “1” if no number is shown). If it’s a polyatomic ion, it’s the number outside of the parentheses the ion is in – if the ion isn’t in parentheses, the number is “1”.
   3. Figure out how many cations you have. This is the number after the symbol of that element. As above, it’s equal to “1” if you don’t see a number.
2. Do the calculation:
   1. Multiply the number you found in “a” above by the number you found in “b.” Once you’ve done this, divide it by the number you found in “c”. Take off the minus charge and you’ve got your Roman numeral.

If you’re given the name, find the formula by doing the following:

1. Write the symbols/names of the cation and anion. The first word in the name tells you what the cation is and the second tells you what the anion is.
2. Indicate the charges on both the cation and anion.
   1. For the cation, the charge is equal to the Roman numeral shown in the name. If the cation is Zn, Cd, or Ag, you just have to have memorized that the charges are +2, +2, and +1, respectively. If it’s not any of these, just count backwards to the last noble gas.
   2. For the anion, count forward to the next noble gas. If it’s a polyatomic ion, the charge can be found on the chart behind the periodic table.
3. Reduce the charges if possible. For example, if the cation has a +4 charge and the anion has a -2 charge, reduce them to a +2 and -1 charge, respectively.
4. Write the formula. The number of cations is equal to the charge on the anion. The number of anions is equal to the charge on the cation. If you have more than one polyatomic ion, put it in parentheses before adding the number.

**Examples:**

Write the name of Fe3(PO4)2

1. The cation is “iron” and the anion is “phosphate.”
2. We do need a Roman numeral because Fe is in one of those shaded areas.
3. To find it, find the charge on the phosphate ion (it’s in the table of polyatomic ions, which says it’s -3), find the number of phosphate ions (it’s 2, the number outside the parentheses), and the number of ion cations (3). Multiply -3 by 2 (6) and then divide by 3. This gives you a Roman numeral of 2.
4. The final name: iron (II) phosphate.

Write the formula of aluminum oxide

1. The cation is “Al” and the anion is “O”.
2. The charge on the cation is +3 (found by counting back to the last noble gas from Al). The charge on the anion is -2 (found by counting forward to the next noble gas. This means that the two ions in the formula are Al+3 and O-2
3. 3 and 2 can’t be reduced.
4. The number of cations is equal to the charge on the anion, which gives us 2 aluminum ions. The number of anions is equal to the charge on the cation, which gives us 3 oxygen ions. This leads to a final formula of Al2O3