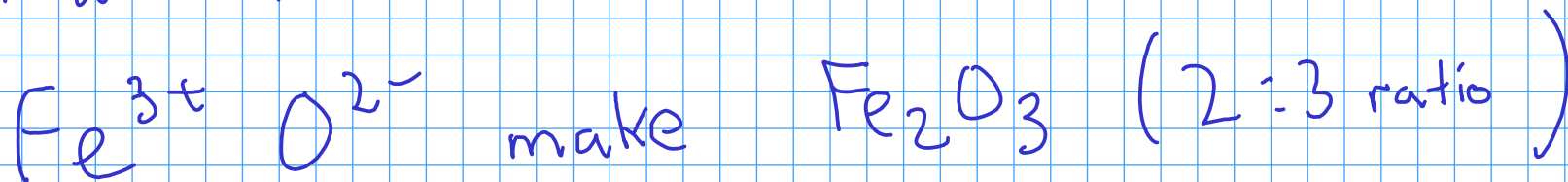
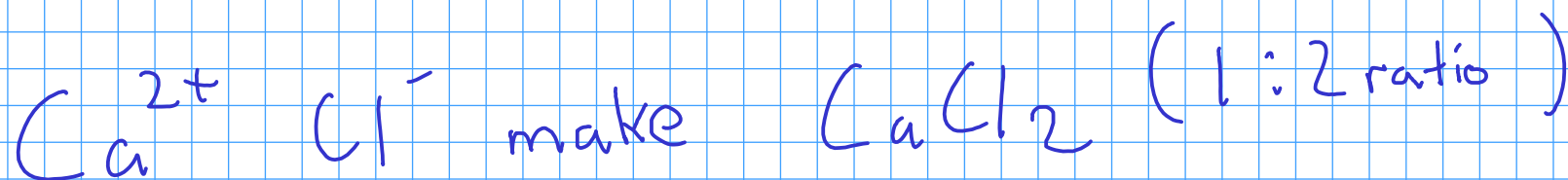
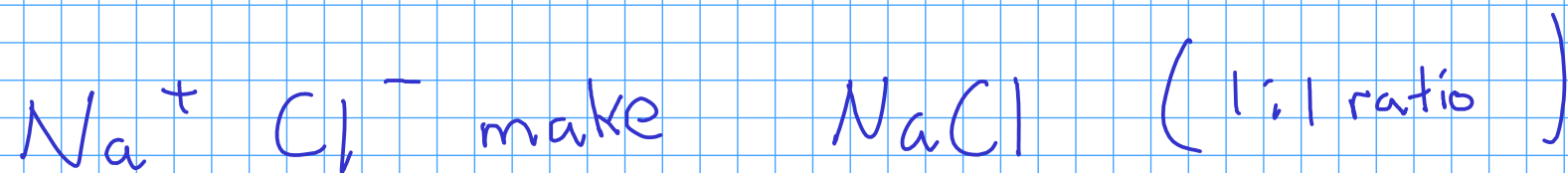


IONIC FORMULAS

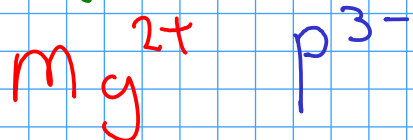
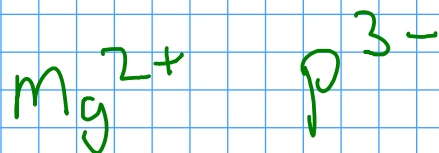
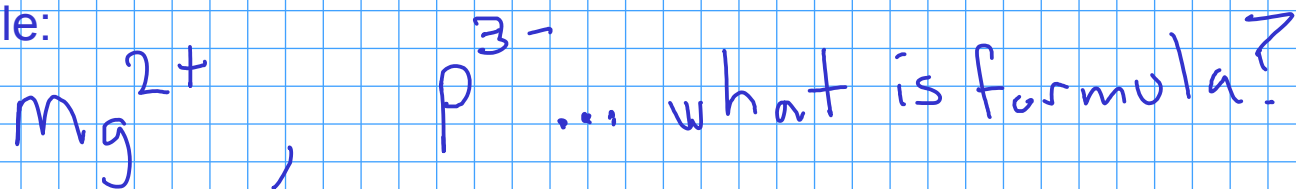
- since there are no "molecules", an ionic formula cannot describe how many and what kinds of atoms are in a molecule!
- all ionic compounds are observed to be (overall) electrically neutral, so the IONS they contain must be present in such a way that the charges BALANCE EACH OTHER
- an ionic formula gives the SMALLEST WHOLE NUMBER RATIO OF CATION TO ANION in the ionic compound



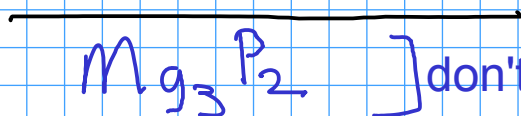
WRITING AN IONIC FORMULA

- if you know the ions that make up a compound, all you need to do is find the smallest ratio of cation to anion the compound needs to have an overall charge of zero

Example:



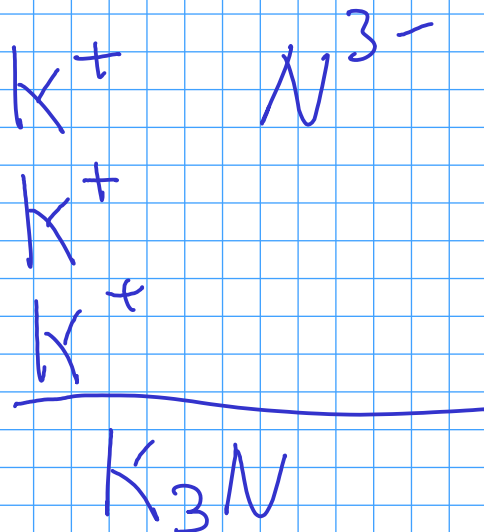
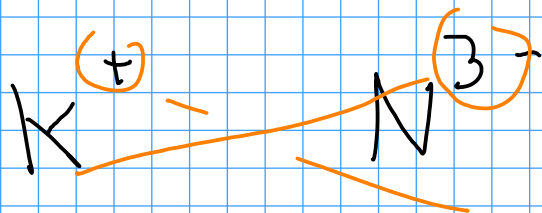
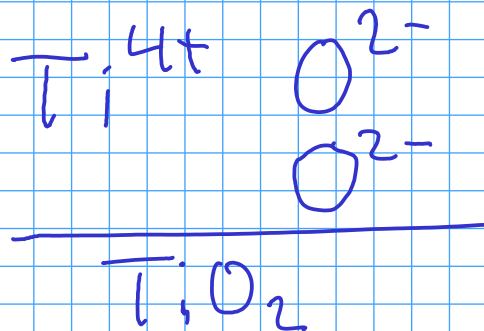
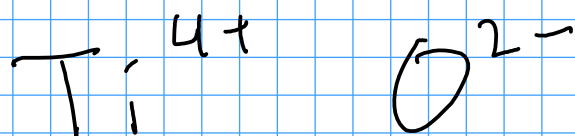
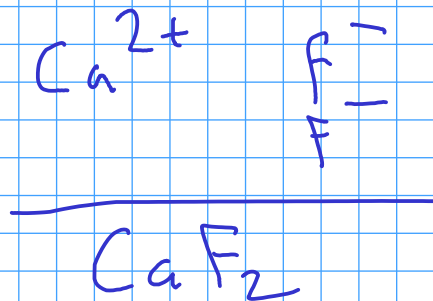
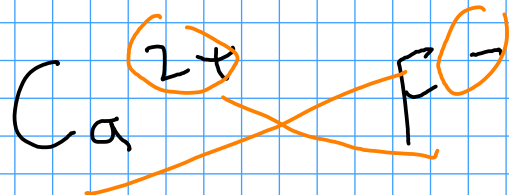
← more - than +, so add more Mg^{2+}



don't write charges on COMPLETE compound

Ionic formulas are ALWAYS written with the cation first, and the anion second!

More examples:



PREDICTING CHARGES

- how do you figure out the charge that an element might take when it becomes an ion?
- for many main group elements, you can predict the charge using the periodic table!

| | | | | | | | | | | | | | | | | | | | |
|--|----|-----|------|-----|----|-----|-------|--------|----|------------------------------------|----|----|------|-----|----|-----|------|-------|----|
| | IA | | | | | | | | | | | | | | | | | VIIIA | |
| | H | | | | | | | | | | | | | | | | | | He |
| | Li | IIA | | | | | | | | | | | IIIA | IVA | VA | VIA | VIIA | | Ne |
| | Na | Mg | IIIB | IVB | VB | VIB | VII B | VIII B | IB | IIB | | Al | Si | P | S | Cl | | Ar | |
| | K | Ca | Sc | Ti | V | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | | Kr |
| | Rb | Sr | Y | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I | | Xe |
| | Cs | Ba | La* | Hf | Ta | W | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | | Rn |
| | Fr | Ra | Ac* | Rf | Db | Sg | Bh | Hs | Mt | *"inner" transition metals go here | | | | | | | | | |

Elements in group VIIIA - the "noble gases" - do not form ions!

Many OTHER main-group elements form either anions or cations that have the same overall number of electrons as the NEAREST (in terms of atomic number) noble gas!

PREDICTING CHARGE

| | | | | | | | | | | | | | | | | | |
|----|-----|------|-----|----|-----|-------|--------|----|------------------------------------|----|----|-----------|------|-----|----------|-------|----------|
| IA | | | | | | | | | | | | nonmetals | | | | | VIIIA |
| H | IIA | | | | | | | | | | | III A | IV A | V A | VIA | VII A | He |
| Li | Be | | | | | | | | | | | B | C | N | O | F | 10 Ne |
| Na | Mg | IIIB | IVB | VB | VIB | VII B | VIII B | IB | IIB | Al | Si | P | S | Cl | 18 Ar | | |
| K | Ca | Sc | Ti | V | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | 36 Kr |
| Rb | Sr | Y | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I | Xe |
| Cs | Ba | La* | Hf | Ta | W | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn |
| Fr | Ra | Ac* | Rf | Db | Sg | Bh | Hs | Mt | *"inner" transition metals go here | | | | | | | | |

Aluminum (Al): At atomic number 13, it is three electrons away from neon (Ne), and 5 electrons away from argon (Ar). Prediction: Aluminum will lose three electrons to form the cation Al^{3+}

Bromine (Br): At atomic number 35, bromine is one electron away from krypton (Kr). Prediction: Bromine will gain one electron to form the anion Br^-

Strontium (Sr): At atomic number 38, strontium is two electrons away from krypton. Prediction: Strontium will lose two electrons to form the cation Sr^{2+}

EXAMPLES

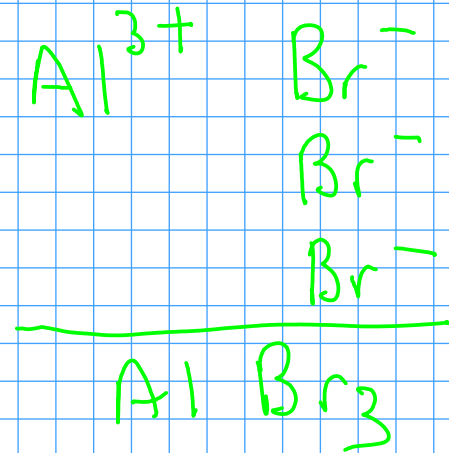
| | | | | | | | | | | | | | | | | | | | |
|----|-----|------|-----|----|-----|------|-------|--------|-------------------------------------|-----|----|----|-------|-----|----|-----|------|----|--------|
| IA | | | | | | | | | | | | | | | | | | | VIII A |
| H | IIA | | | | | | | | | | | | III A | IVA | VA | VIA | VIIA | | He |
| Li | Be | | | | | | | | | | | | B | C | N | O | F | Ne | |
| Na | Mg | IIIB | IVB | VB | VIB | VIIB | VIIIB | VIII B | IB | IIB | | | Al | Si | P | S | Cl | Ar | |
| K | Ca | Sc | Ti | V | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | Kr | | |
| Rb | Sr | Y | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I | Xe | | |
| Cs | Ba | La* | Hf | Ta | W | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn | | |
| Fr | Ra | Ac* | Rf | Db | Sg | Bh | Hs | Mt | * "inner" transition metals go here | | | | | | | | | | |

Find the formulas of:

- (1) an ionic compound containing Al and Br
- (2) an ionic compound containing Mg and O
- (3) an ionic compound containing S and K

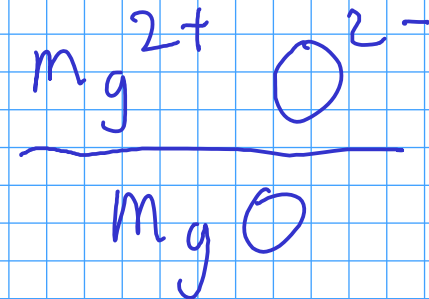
Find the formula of:

* an ionic compound containing Al and Br



Find the formula of:

* an ionic compound containing Mg and O



Find the formula of:

* an ionic compound containing S and K

