SNC2D CHEMISTRY

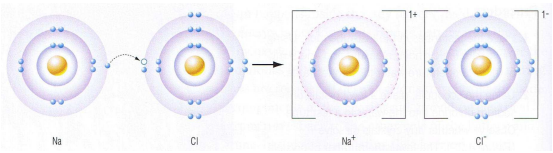
CHEMICAL REACTIONS

- Ionic Compounds (P.156-160;162)

Ionic Compounds

RECALL!

In ionic compounds, electrons are transferred from one atom to another (or to several others) so that the atoms can have the stable electron arrangements of the closest noble gases. Salt (NaCl) is an example of an ionic compound made up of ions of opposite charge that attract each other.



Activity: Ionic Compound Names (P.159)

DO NOT COPY!

1. Write the name of the metal first.
2. Write the name of the non-metal next – change the ending to **ide**.

NOTE!

In the case of all ionic compounds, the positive ion goes first and the negative ion goes second.

Activity: Ionic Compound Names (P.159)

QUESTIONS

1. Write the ionic compound names for the following combinations of elements.
   (a) calcium & iodine — calcium iodide

RECALL!

1. Write the name of the metal first.
2. Write the name of the non-metal next and change the ending to **ide**.

Activity: Ionic Compound Names (P.159)

QUESTIONS

1. Write the ionic compound names for the following combinations of elements.
   (a) calcium & iodine — calcium iodide
   (b) aluminum & sulphur — aluminum sulphide
   (c) magnesium & oxygen — magnesium oxide

Activity: Ionic Compound Formulas (P.162)

DO NOT COPY!

1. Write the element symbols with the metal first.
2. Write the ionic charge for each element above the symbols.
3. If possible divide the ionic charges by a common factor.
4. Crisscross the ionic charges using them as subscripts. IGNORE SIGNS!

Activity: Ionic Compound Formulas (P.162)

QUESTIONS

1. Write the ionic compound formulas for the previous combinations of elements.

(a) calcium & iodine — Ca^{2+} I^{1-} ☞ CaI_2

RECALL!

1. Write the element symbols with the metal first.
2. Write the ionic charges for each element above the symbols.
3. If possible divide the ionic charges by a common factor.
4. Crisscross the ionic charges using them as subscripts. Ignore signs.

Activity: Ionic Compound Formulas (P.162)

QUESTIONS

1. Write the ionic compound formulas for the previous combinations of elements.

(a) calcium & iodine — Ca^{2+} I^{1-} ☞ CaI_2

(b) aluminum & sulphur — Al^{3+} S^{2-} ☞ Al_2S_3

(c) magnesium & oxygen — Mg^{2+} O^{2-} ☜ divide by 2 ☞ MgO

Multivalent Elements

RECALL!

Transition metals have more than 1 ionic charge and are able to form more than one kind of ion. These compounds are named in the same way as other ionic compounds, except that the charge on the metal is written, in brackets, as a Roman numeral after the name of the metal.

Element	Ion Charge	Symbol	Name
nickel	2+ 3+	Ni^{2+} Ni^{3+}	nickel (II) nickel (III)
lead	2+ 4+	Pd^{2+} Pb^{4+}	lead (II) lead (IV)
gold	3+ 1+	Au^{3+} Au^{+}	gold (III) gold (I)

Multivalent Elements

NOTE!

You <u>only</u> use the Roman numeral system when naming the ions of metals that can have more than one ionic charge.

Element	Ion Charge	Symbol	Name
nickel	2+ 3+	Ni^{2+} Ni^{3+}	nickel (II) nickel (III)
lead	2+ 4+	Pd^{2+} Pb^{4+}	lead (II) lead (IV)
gold	3+ 1+	Au^{3+} Au^{+}	gold (III) gold (I)

Activity: Names & Formulas for … (P.160)

DO NOT COPY!

1. Compounds that contain a multivalent element are named in the same way as other ionic compounds, except that the charge on the metal is written, in brackets, as a Roman numeral after the name of the metal (i.e. iron (II) oxide).

2. Formulas for compounds that contain a multivalent element are written in the same way as other ionic compounds. The charge on the metal ion is indicated by the Roman numeral located in the set of brackets after the name of the metal.

Activity: Names & Formulas for … (P.160)

QUESTIONS

1. Write the chemical names and formulas for the following combinations of elements.

(a) copper (I) & chlorine
copper (I) chloride

$^{1+}Cu \times {}^{1-}Cl$ ☞ $CuCl$

(b) copper (II) & chlorine
copper (II) chloride

$^{2+}Cu \times {}^{1-}Cl$ ☞ $CuCl_2$

(c) tin (IV) & oxygen
tin (IV) oxide

$^{2+}Sn \times {}^{2-}O$ ☜ divide by 2 ☞ SnO_2

✔ Check Your Learning

1. What combinations of two elements combine to form ionic compounds?

   metals and non-metals

✔ Check Your Learning

2. Write the chemical names for each of the following ionic compounds.
   (a) Li_2O lithium oxide
   (b) CaO calcium oxide
   (c) BeF beryllium fluoride
   (d) Na_3N sodium nitride
   (e) Al_2O_3 aluminum oxide
   (f) $CuCl_2$ copper (II) chloride ☞ *multivalent*
   (g) $FeBr_3$ iron (III) bromide ☞ *multivalent*
   (h) PbS lead (II) sulphide ☞ *multivalent*
   (i) SnO_2 tin (IV) oxide ☞ *multivalent*
   (j) $PbCl_4$ lead (IV) chloride ☞ *multivalent*

✔ Check Your Learning

3. Write the chemical formulas for each of the following ionic compounds.
   (a) sodium fluoride NaF
   (b) magnesium chloride $MgCl_2$
   (c) aluminum nitride AlN
   (d) beryllium oxide BeO
   (e) magnesium nitride Mg_3N_2
   (f) copper(I) bromide CuBr
   (g) iron(III) chloride $FeCl_3$
   (h) lead(II) oxide PbO
   (i) lead(IV) fluoride PbF_4
   (j) copper(II) phosphide Cu_3P_2

✔ Check Your Learning

TEXTBOOK

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