

ChemThink: Ionic Bonding

Ionic Bonds

How do **charges** interact?

What is needed to build an **ionic compound**?

Where on the **periodic table** do we find elements that form **ions**?

How are **positive** & **negative** ions formed?

How is an **ionic bond** formed using **sodium** and **chlorine**? (simplistic)

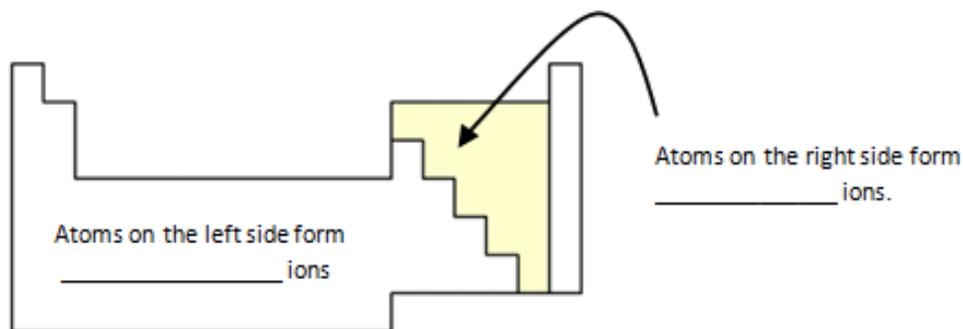
How is an **ionic bond** formed using **sodium** and **chlorine**? (real world)

The end result is....

Describe the 3-d model.

- are formed between _____
- a bond that involves the _____ of electrons
- when two **negative** ions get close to each other _____
- when a **positive** and a **negative** ion get close to each other _____
- charges that are alike will _____ each other; opposite charges will _____ and _____ to each other

Answer:



- + ions formed when atoms _____ electrons
- - ions formed when atoms _____ electrons
- Sodium atom (gained/lost) 1 electron to chlorine. **Sodium atom** became (positive/negative) **ion** and its overall atomic size (decreased/increased).
- Chlorine atom (gained/lost) 1 electron from sodium. **Chlorine atom** became (positive/negative) ion and its overall atomic size (decreased/increased)
- the two ions are held together by the (attraction / repulsion) between the opposite charges
- Chlorine is a gas that has _____ atoms it is a _____ molecule & has the formula _____
- each Na^+ ion is bonded to a _____ ion because opposites attract,
- the positive ions (Na^+) will attract any _____ ions around them just as the negative ions (Cl^-) will attract any _____ ions that are nearby.
- other ion pairs are also attracted building a _____ and grows in three dimensions until _____
- each ion is surrounded by ions of (the same / opposite) charge
- there is a regular arrangement of _____ and _____ ions

Writing the formula.	<ul style="list-style-type: none"> • There are _____ sodium ions & there are ____ chlorine ions. • Every sodium ion has ____ chlorine ion so the ratio is 1 to 1. • the formula is written _____
calcium fluoride	<ul style="list-style-type: none"> • since there are ____ calcium ions to ____ fluoride ions, this reduces to a ____ : ____ ratio • the formula for calcium fluoride is _____

ChemThink: Ionic Formulas

Noble Gases	<ul style="list-style-type: none"> • do not form _____ because they are already stable & (do/do not) react
many other atoms	<ul style="list-style-type: none"> • form ions that have the same _____ of electrons as a noble gas • this fact will help us predict what the _____ on an ion will be
sodium's electrons	<ul style="list-style-type: none"> • sodium atom has ____ electrons & has to lose ____ or gain ____ electrons
Why does sodium lose one electron?	<ul style="list-style-type: none"> • because _____
sodium ions	<ul style="list-style-type: none"> • sodium always loses / gains 1 electron to become a +1 ion
chlorine's electrons	<ul style="list-style-type: none"> • chlorine atom has ____ electrons & has to lose ____ or gain ____ electrons • chlorine always loses / gains 1 electron to form a -1 ion
barium	<ul style="list-style-type: none"> • the closest noble gas is _____ with 54 electrons • barium will _____ 2 electrons to form an ion with a +2 charge
oxygen	<ul style="list-style-type: none"> • oxygen will _____ 2 electrons • the oxide ion has 10 electrons, the same number as _____ • the oxide ion has a _____ charge
ionic compounds	<ul style="list-style-type: none"> • we need one atom that can lose electrons (+ / - ion) & one atom that can gain electrons (a + / - ion) • the total electrons lost must _____ the total electrons gained
sodium and oxygen	<ul style="list-style-type: none"> • sodium will give up ____ electron and form a _____ ion • but oxygen needs to gain ____ electrons because it forms a -2 ion • there needs to be ____ sodium atoms • the ratio of sodium to oxygen is ____ : ____, so the formula is _____

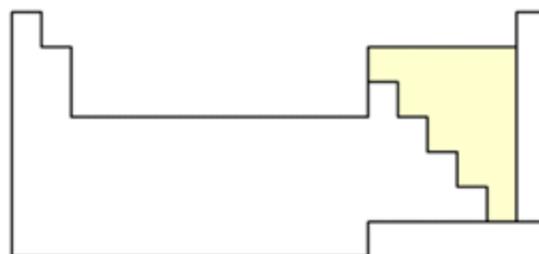
When atoms react to form ionic compounds...	# of electrons lost must _____ # of electrons gained OR total positive charge must _____ total negative charge
Ca & F	<ul style="list-style-type: none"> Ca will have a _____ charge and F will have a _____ charge the formula is _____
Li & N	<ul style="list-style-type: none"> Li will have a _____ charge and N will have a _____ charge the formula is _____
Al & S	<ul style="list-style-type: none"> Al will have a _____ charge and S will have a _____ charge the formula is _____
Summary	<ul style="list-style-type: none"> an ionic compound must have one atom that can _____ electrons and another atom that can _____ electrons the number of each type of atom needed to form the compound is determined by the _____ # of electrons _____ = # of electrons _____ the total positive charge is _____ the total negative charge

Chemthink: Covalent Bonding

1. Covalent bonding is a bond that forms when atoms are _____ electrons.
2. How is the movement of electrons different when atoms are close?
3. What happens if you try to move atoms very close to each other?
4. The nucleus of an atom has an (attraction/repulsion) for its **own electron**.
5. When atoms get close, the nucleus of an atom can (attract/repel) an **electron** from **another atom**.
6. A covalent bond is formed when atoms are attracted to the _____ electrons, but neither one can take them away from the other.

Who Bonds

7. **Circle** the part of the periodic table the atoms in a covalent bond come from.
8. Therefore, a covalent bond will form between:
9. Hydrogen is considered to be a _____ and will form a _____ bond.



Energy in Bonding

10. When two atoms move close together, the potential energy (increases/decreases) because each nucleus is attracting the other atoms electron more & more _____.
11. If the atoms are put too close, the potential energy (increases/decreases) because the _____ in each atom are repelling each other.
12. When atoms are arranged so that potential energy is at a minimum, they are at the most _____ balance between attractions and repulsions. The distance between the atoms at this point results in the _____ length.
13. Lower in energy = _____

The Bonds

14. A single line is used to represent the _____ of electrons being shared.
15. Draw hydrogen atoms sharing 1 pair of electrons.
16. How many total electrons are shared in a single bond? _____
17. Draw oxygen atoms sharing 2 pairs of electrons.
18. How many total electrons are shared in a double bond? _____
19. Draw nitrogen atoms sharing 3 pairs of electrons.
20. How many total electrons are shared in a triple bond? _____
21. The bond that tends to be the strongest is _____.

Naming:

22. When naming covalent compounds the ending of the second element gets changed to _____.
23. When naming covalent compounds, _____ have been added to many of the element names.
24. Prefixes are added in front of each _____ name to tell us how many _____ of that element are present in the molecule.
25. Exception: Never use the prefix _____, if there is one atom of the _____ element.

Summary:

26. Covalent bonds form between two _____.
27. Atoms in covalent bonds are more _____ when they are bonded together than when they are apart.