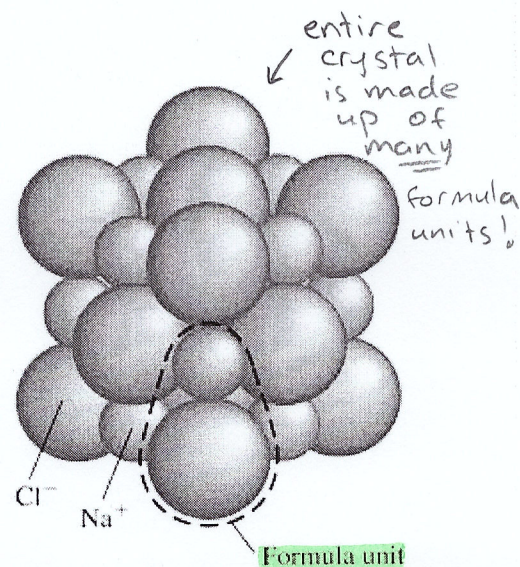


## Ionic Crystals

- Recall that an ionic compound is created when oppositely charged ions bond together due to the electrostatic attraction between oppositely charged ions
- Keep in mind that there is more than one negative ion and more than one positive ion
  - Therefore, the electrostatic attractive force exists between all positive and negative ions allowing the ions to pack together very tightly to create three-dimensional pattern
  - This 3-D array of alternating positive and negative ions is called a **crystal lattice**

- Consider a simple ionic compound; sodium chloride (NaCl)

- The oppositely charged ions are attracted together and form an ionic bond
- However, all the positively charged sodium ions are attracted to all the negatively charged chloride ions around it and vice versa.
- Therefore, there is no pair of sodium and chlorine ions that you could identify as a "molecule".
- \* The formula  $\text{NaCl}_{(s)}$  simply means the sodium and chloride ions are in a 1:1 ratio to ensure a neutral charge
- Similarly, the formula  $\text{CaF}_{2(s)}$  means there is a ratio of one calcium ion to two fluoride ions in a crystal of calcium fluoride.
- The smallest whole number ratio of ions in a crystal is called a **formula unit** and not a molecule.



- There are many different crystal shapes that depend on the relative size and charge of the individual ions

### Crystal lattice examples

