

Chem 103 Spring 2005

Solution to Assignment 2 Extra Problem

Ionic bonding – true or false?

- 1. A positive ion will be attracted to any negative ion.*
TRUE: any positively charged object will be attracted to any negatively charged object. It does not matter how the objects acquired the charge, the attraction only depends on the amount of charge, and the distance between the two charged objects.
- 2. A sodium ion is only bonded to the chloride ion it donated its electron to.*
FALSE: each positive sodium ion is bonded to each of the neighbouring negative chloride counter-ions. It is irrelevant how the ions came to be charged.
- 3. A sodium atom can only form one ionic bond, because it only has one electron in its outer shell to donate.*
FALSE: a sodium ion can strongly bond to as many chloride ions as can effectively pack around it in the regular crystal lattice. In NaCl there will be six chloride ions strongly bonded to each sodium ion.
- 4. The reason a bond is formed between chloride ions and sodium ions is because an electron has been transferred between them.*
FALSE: The reason a bond is formed between chloride ions and sodium ions is because they have opposite electrostatic charges - negative and positive.
- 5. In the diagram each molecule of sodium chloride contains one sodium ion and one chloride ion.*
FALSE: there are no molecules in sodium chloride, just ions. A molecule comprises a group of atoms strongly bound together, and only weakly bonded (if at all) to other molecules. In sodium chloride each ion is strongly bonded to each of its six nearest neighbours.
- 6. An ionic bond is the attraction between a positive ion and a negative ion.*
TRUE.
- 7. A positive ion can be bonded to any neighbouring negative ion, if it is close enough.*
TRUE. The bond is just the attraction between the oppositely charged ions. If the ions are close together this force will be a strong bond.
- 8. The reason a bond is formed between chloride ions and sodium ions is because they have opposite charges.*
TRUE: The opposite charges attract them together, and this force of attraction is the ionic bond.
- 9. An ionic bond is when one atom donates an electron to another atom, so that they both have full outer shells.*
FALSE: an ionic bond is the electrostatic force which holds two oppositely charged ions together. The ions could have become charged by electron transfer, but usually the ions were charged long before they came into contact. The bond is no stronger in the few cases where an electron has transferred between two atoms to give the ions that have become bonded.
- 10. There are no molecules shown in the diagram.*
TRUE: A molecule comprises a group atoms strongly bound together, and only weakly bonded (if at all) to other molecules. In sodium chloride each ion is strongly bonded to each of its six nearest neighbours.