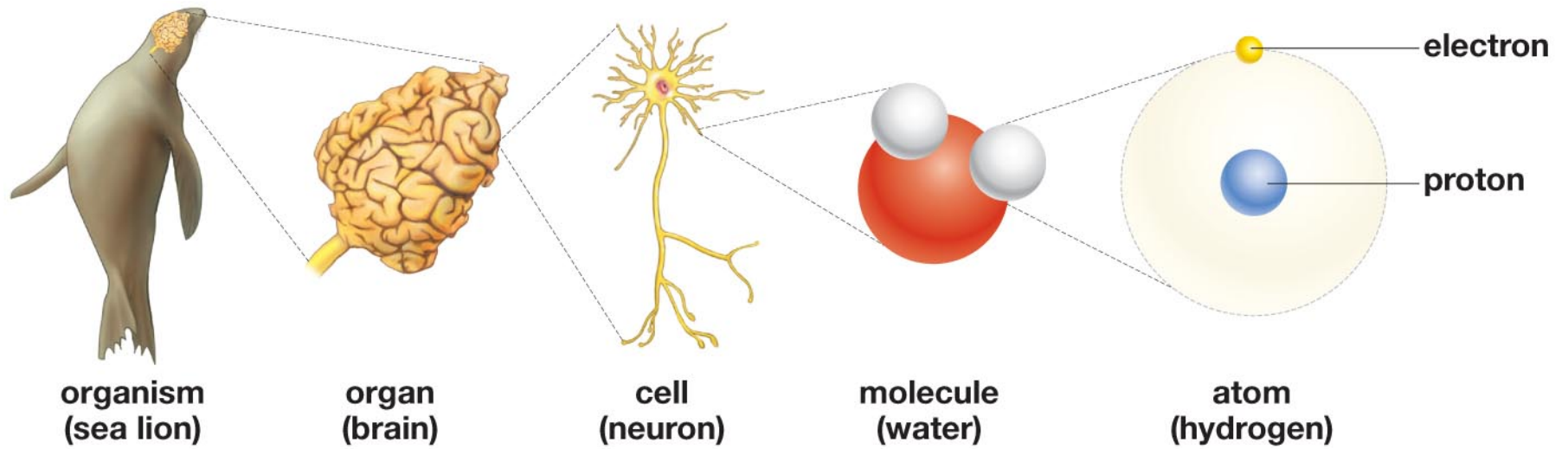


Fig. 2.4



© 2011 Pearson Education, Inc.

[“The Scale of the Universe”:](http://htwins.net/scale2/)
<http://htwins.net/scale2/>

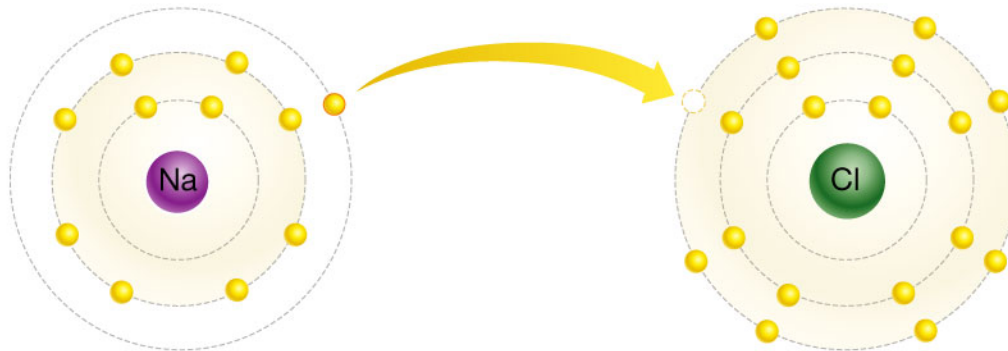
Fig. 2.1

(a) Initial instability

Sodium has but a single electron in its outer shell, while chlorine has seven, meaning it lacks only a single electron to have a completed outer shell.

sodium atom (Na)

chlorine atom (Cl)



(b) Electron transfer

When these two atoms come together, sodium loses its third-shell electron to chlorine, in the process becoming a sodium ion with a net positive charge (because it now has more protons than electrons). Having gained an electron, the chlorine atom becomes a chloride ion, with a net negative charge (because it has more electrons than protons).

electron transfer

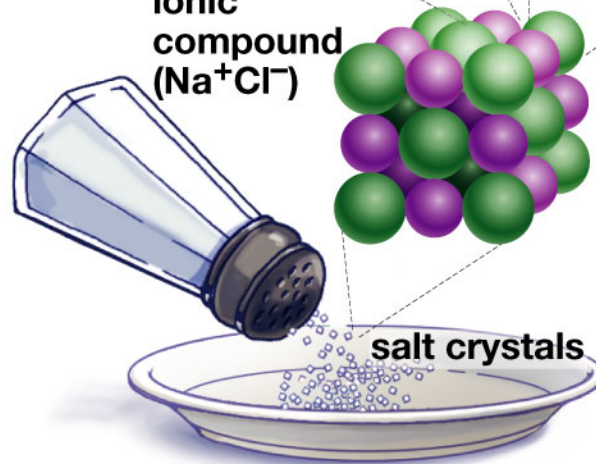
sodium ion (Na⁺)

chloride ion (Cl⁻)

ionic compound (Na⁺Cl⁻)

(c) Ionic attraction

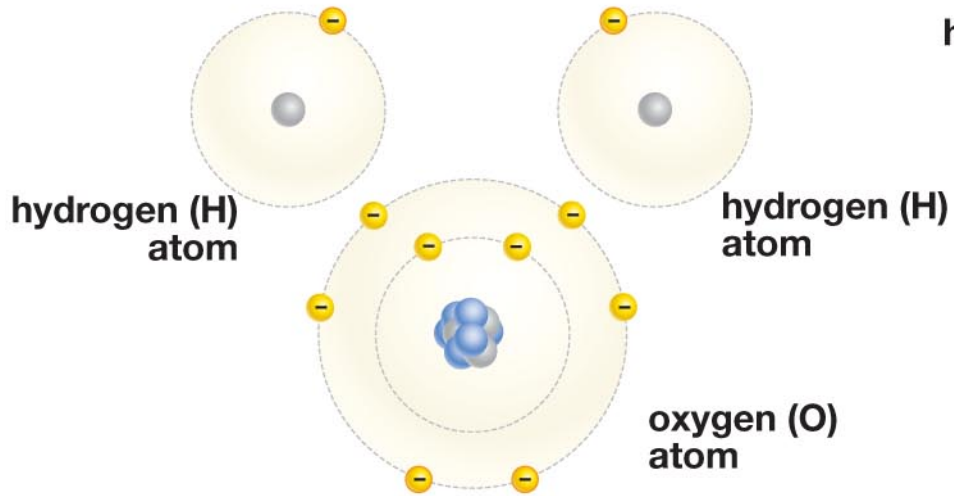
The sodium and chloride ions are now attracted to each other because they are oppositely charged.



(d) Compound formation

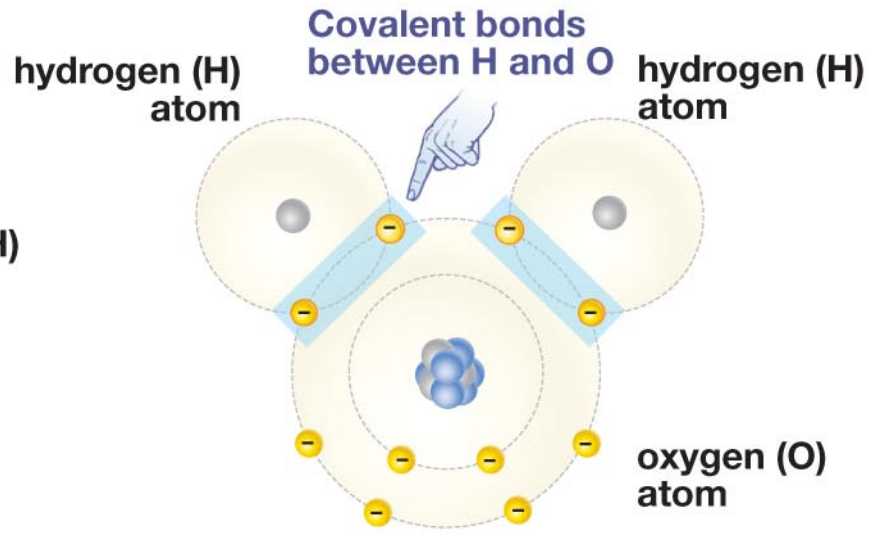
The result of this electrostatic attraction, involving many sodium and chloride ions, is a sodium chloride crystal (NaCl), better known as table salt.

Fig. 2.9



(a) Two hydrogen atoms and one oxygen atom

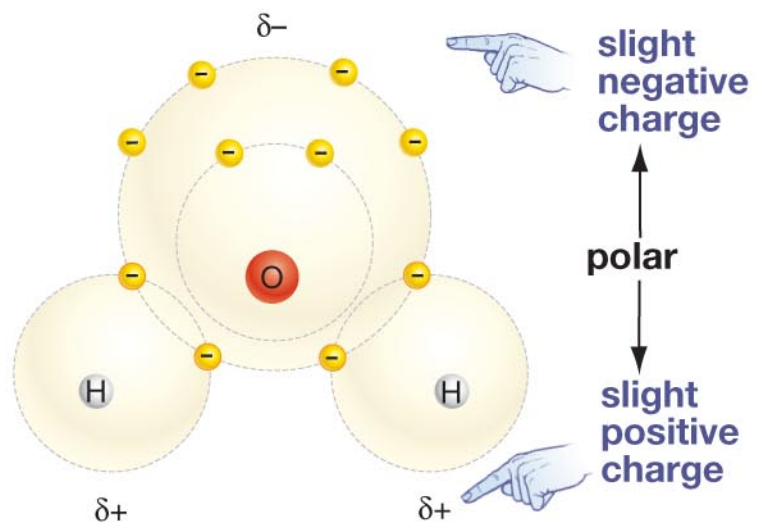
© 2011 Pearson Education, Inc.



(b) One water molecule

Fig. 2.7

(a) Polar water molecule



(b) Nonpolar methane molecule

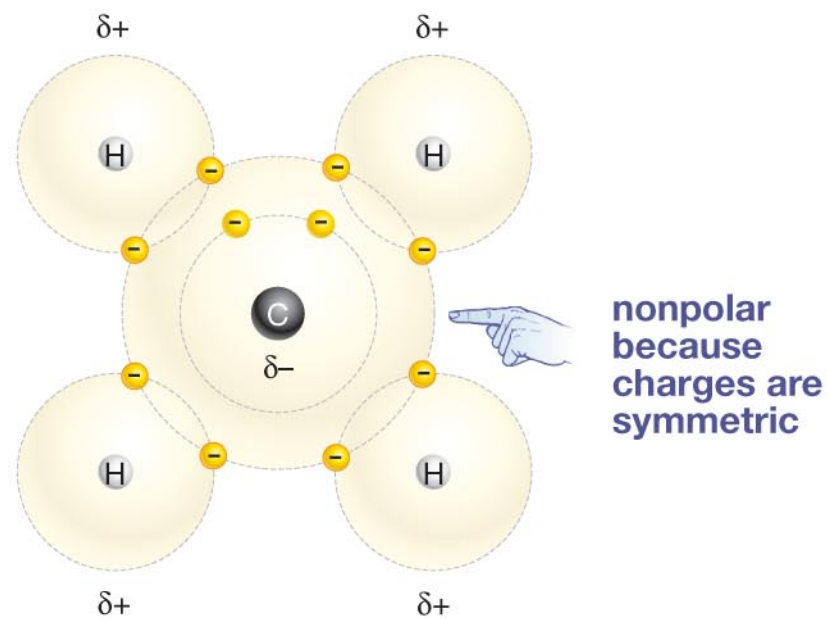


Fig. 2.8

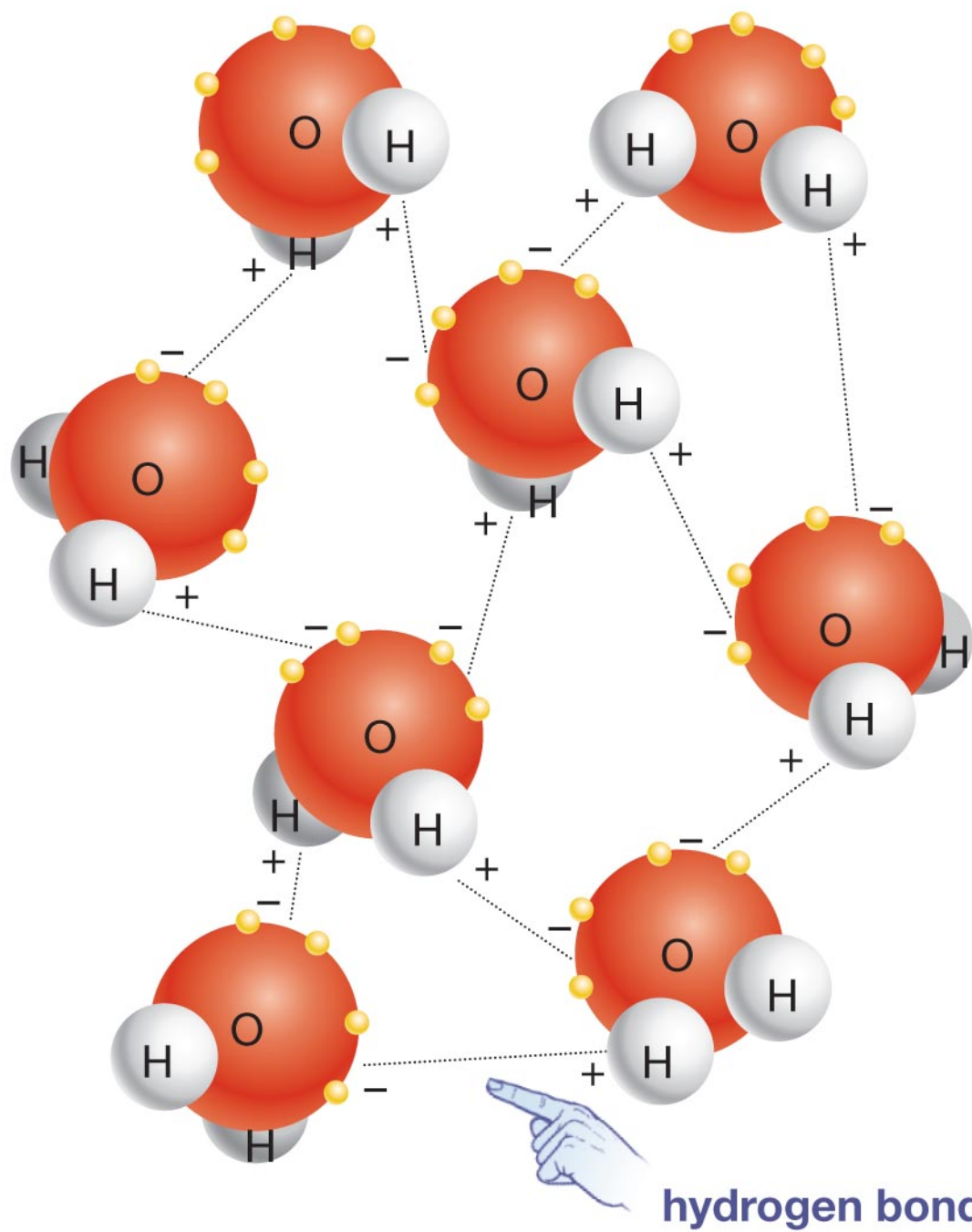
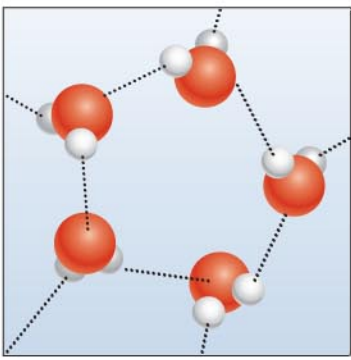


Fig. 2.10

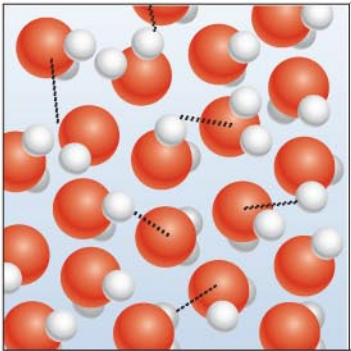
hydrogen bond

ice



In ice, the maximum number of hydrogen bonds form, causing the molecules to be spread far apart.

liquid water



In liquid water, hydrogen bonds constantly break and re-form, enabling a more dense spacing than in ice.



(a) Walking on water



(b) Beading up



© 2011 Pearson Education, Inc.

[“The Most Astounding Fact”](#): Neil deGrasse Tyson

Fig. 2.16

