

# Chemistry Review – For Senior Level Biology Course

Senior Biology courses deal mainly with the chemical reaction found inside living organisms.



# Teach With Fergy Preview File

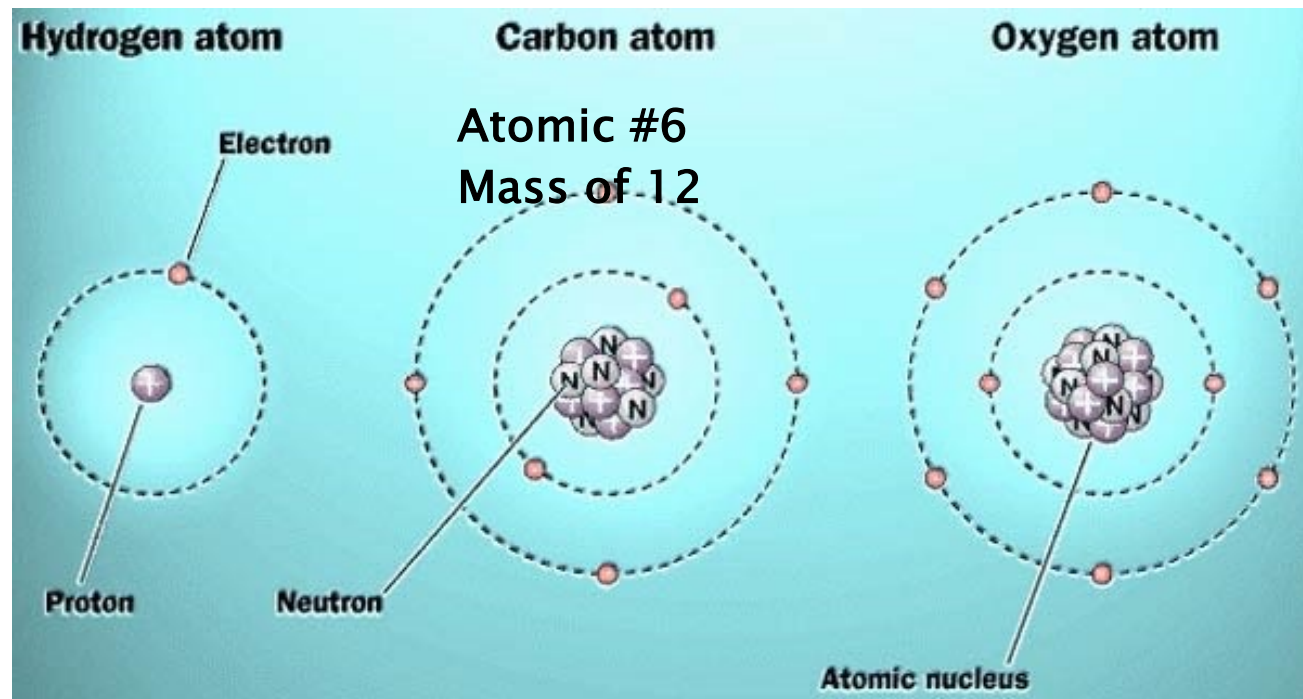
Please enjoy this preview of your Power Point.

- Some slides appear blank because they have been removed.
- Other slides may have ..... on them, this represents writing that has been removed.
- Please note that the Entire Unit Package can also be purchased at a steep discount from my Store.

# Atoms

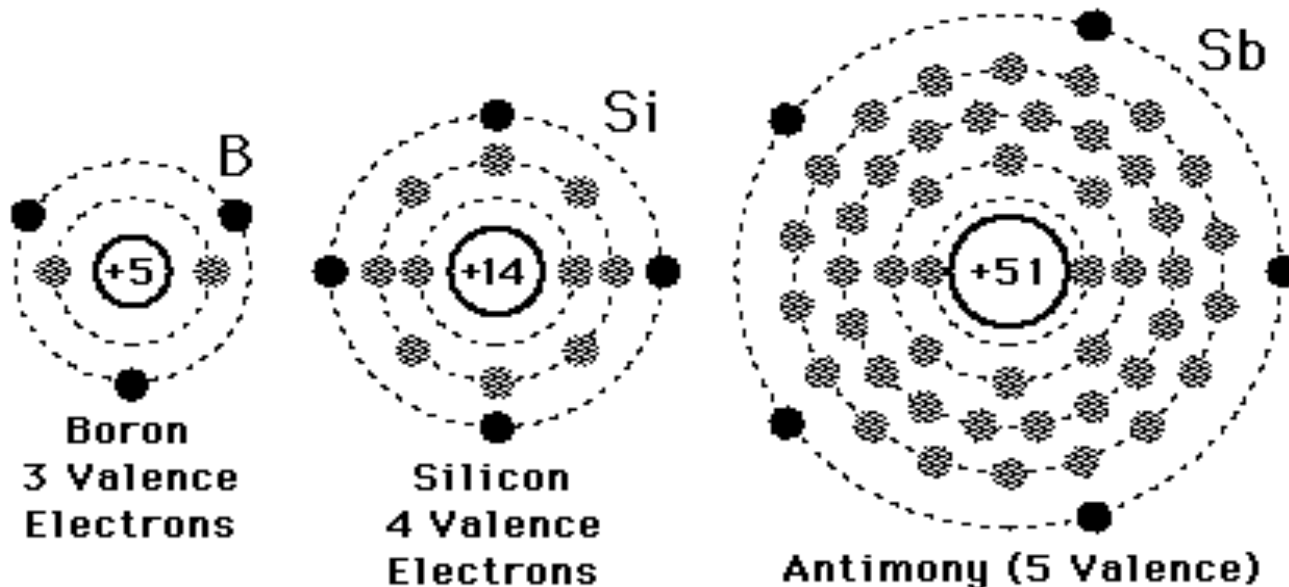
- ▶ All **atoms** are made up of \_\_\_\_\_
- ▶ An element's **atomic mass** is calculated by adding the \_\_\_\_\_

Atomic #1  
Mass of 1



# Valence Electrons

- The Electrons in the outer most shell are called the Valence Electrons
- The chemical behaviour of an atom is determined by the number and arrangement of its valence electrons.



Slide has been removed

# ► Which are the top 4 biologically?

The six elements highlighted in yellow make up 98% of the mass of any living organism.

Elements shown in orange are present in tiny amounts in many organisms.

Vertical columns have elements with similar properties.

|                     |                                                                                        |                                                                         |                    |                     |                    |                     |                    |                     |                                                         |                     |                    |                    |                    |                     |                    |                    |                    |
|---------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|---------------------------------------------------------|---------------------|--------------------|--------------------|--------------------|---------------------|--------------------|--------------------|--------------------|
| 1<br>H<br>1.0079    | The six elements highlighted in yellow make up 98% of the mass of any living organism. |                                                                         |                    |                     |                    |                     |                    |                     |                                                         |                     |                    |                    |                    |                     |                    |                    | 2<br>He<br>4.003   |
| 3<br>Li<br>6.941    | 4<br>Be<br>9.012                                                                       | Chemical symbol<br>Atomic number<br>Atomic weight                       |                    |                     |                    |                     |                    |                     |                                                         |                     |                    | 5<br>B<br>10.81    | 6<br>C<br>12.01    | 7<br>N<br>14.00     | 8<br>O<br>15.999   | 9<br>F<br>18.998   | 10<br>Ne<br>20.179 |
| 11<br>Na<br>22.990  | 12<br>Mg<br>24.305                                                                     | Elements shown in orange are present in tiny amounts in many organisms. |                    |                     |                    |                     |                    |                     |                                                         |                     |                    | 13<br>Al<br>26.982 | 14<br>Si<br>28.086 | 15<br>P<br>30.974   | 16<br>S<br>32.06   | 17<br>Cl<br>35.453 | 18<br>Ar<br>39.948 |
| 19<br>K<br>39.098   | 20<br>Ca<br>40.08                                                                      | 21<br>Sc<br>44.956                                                      | 22<br>Ti<br>47.88  | 23<br>V<br>50.942   | 24<br>Cr<br>51.996 | 25<br>Mn<br>54.938  | 26<br>Fe<br>55.847 | 27<br>Co<br>58.933  | 28<br>Ni<br>58.69                                       | 29<br>Cu<br>63.546  | 30<br>Zn<br>65.38  | 31<br>Ga<br>69.72  | 32<br>Ge<br>72.59  | 33<br>As<br>74.922  | 34<br>Se<br>78.96  | 35<br>Br<br>79.909 | 36<br>Kr<br>83.80  |
| 37<br>Rb<br>85.4778 | 38<br>Sr<br>87.62                                                                      | 39<br>Y<br>88.906                                                       | 40<br>Zr<br>91.22  | 41<br>Nb<br>92.906  | 42<br>Mo<br>95.94  | 43<br>Tc<br>(99)    | 44<br>Ru<br>101.07 | 45<br>Rh<br>102.906 | 46<br>Pd<br>106.4                                       | 47<br>Ag<br>107.870 | 48<br>Cd<br>112.41 | 49<br>In<br>114.82 | 50<br>Sn<br>118.69 | 51<br>Sb<br>121.75  | 52<br>Te<br>127.60 | 53<br>I<br>126.904 | 54<br>Xe<br>131.30 |
| 55<br>Cs<br>132.905 | 56<br>Ba<br>137.34                                                                     | 57-71<br>La-Lu                                                          | 72<br>Hf<br>178.49 | 73<br>Ta<br>180.948 | 74<br>W<br>183.85  | 75<br>Re<br>186.207 | 76<br>Os<br>190.2  | 77<br>Ir<br>192.2   | 78<br>Pt<br>195.08                                      | 79<br>Au<br>196.967 | 80<br>Hg<br>200.59 | 81<br>Tl<br>204.37 | 82<br>Pb<br>207.19 | 83<br>Bi<br>208.980 | 84<br>Po<br>(209)  | 85<br>At<br>(210)  | 86<br>Rn<br>(222)  |
| 87<br>Fr<br>(223)   | 88<br>Ra<br>226.025                                                                    | 89-103<br>Ac-Lr                                                         | 104                | 105                 | 106                | 107                 | 108                | 109                 | Vertical columns have elements with similar properties. |                     |                    |                    |                    |                     |                    |                    |                    |

Lanthanide series

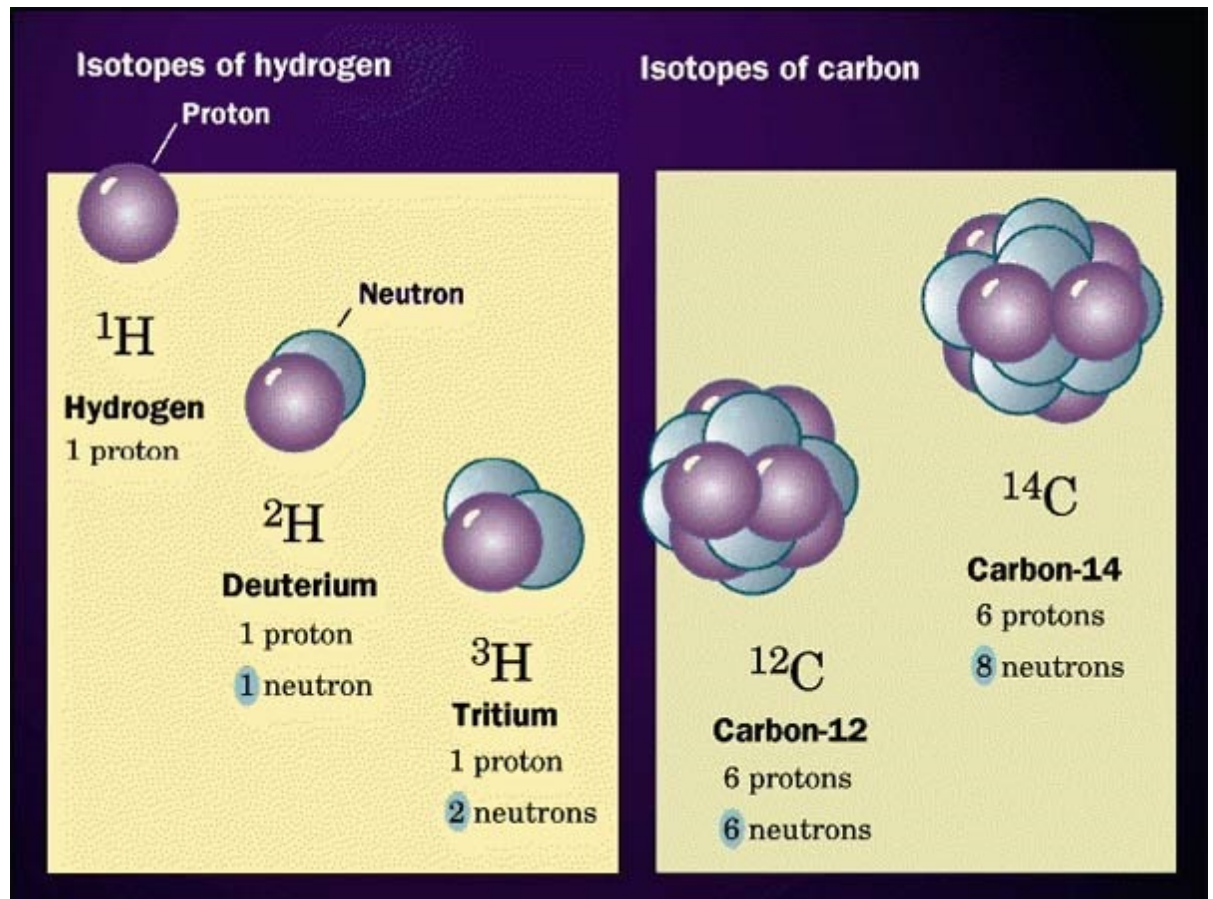
|                     |                    |                      |                    |                   |                    |                    |                    |                     |                    |                     |                    |                     |                    |                    |
|---------------------|--------------------|----------------------|--------------------|-------------------|--------------------|--------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|--------------------|
| 57<br>La<br>138.906 | 58<br>Ce<br>140.12 | 59<br>Pr<br>140.9077 | 60<br>Nd<br>144.24 | 61<br>Pm<br>(145) | 62<br>Sm<br>150.36 | 63<br>Eu<br>151.96 | 64<br>Gd<br>157.25 | 65<br>Tb<br>158.924 | 66<br>Dy<br>162.50 | 67<br>Ho<br>164.930 | 68<br>Er<br>167.26 | 69<br>Tm<br>168.934 | 70<br>Yb<br>173.04 | 71<br>Lu<br>174.97 |
|---------------------|--------------------|----------------------|--------------------|-------------------|--------------------|--------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|--------------------|

Actinide series

|                     |                     |                      |                   |                      |                   |                   |                   |                   |                   |                   |                    |                    |                    |                    |
|---------------------|---------------------|----------------------|-------------------|----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|
| 89<br>Ac<br>227.028 | 90<br>Th<br>232.038 | 91<br>Pa<br>231.0359 | 92<br>U<br>238.02 | 93<br>Np<br>237.0482 | 94<br>Pu<br>(241) | 95<br>Am<br>(243) | 96<br>Cm<br>(247) | 97<br>Bk<br>(247) | 98<br>Cf<br>(251) | 99<br>Es<br>(252) | 100<br>Fm<br>(257) | 101<br>Md<br>(258) | 102<br>No<br>(259) | 103<br>Lr<br>(260) |
|---------------------|---------------------|----------------------|-------------------|----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|

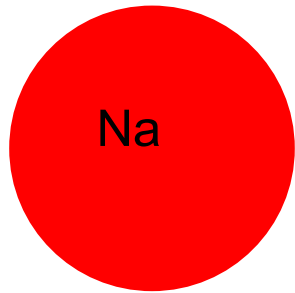
# Isotopes

- Some atoms called \_\_\_\_\_ have a different number .....

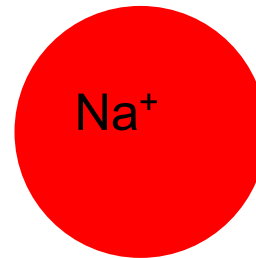


An *ion* is an atom, or group of atoms, that has a net positive or negative charge.

*cation* → \_\_\_\_\_. If a neutral atom loses one or more electrons it becomes a cation.



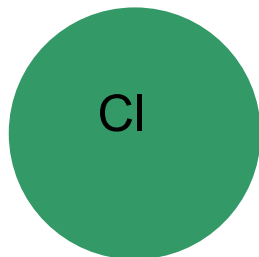
11 protons  
11 electrons



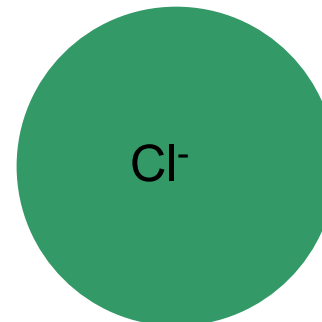
11 protons  
10 electrons

*anion* → ion with a negative charge.

---



17 protons  
17 electrons



17 protons  
18 electrons

Slide has been removed

# Forces of Attraction

1. Intramolecular Force \_\_\_\_\_

- The force that holds atoms of molecules together.

2. Intermolecular Force \_\_\_\_\_

.....

Slide has been removed

# Intermolecular forces - Van der Waals forces

- Chemical bonds between molecules
- Weaker than intramolecular bonds
- Determine .....

- Three types:

---

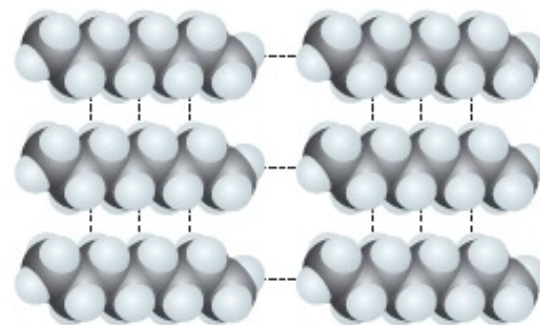
---

---



# London forces

- \_\_\_\_\_
- Formed by temporary .....
- Ex. Octane ( $C_8H_{18}$ ) holds .....



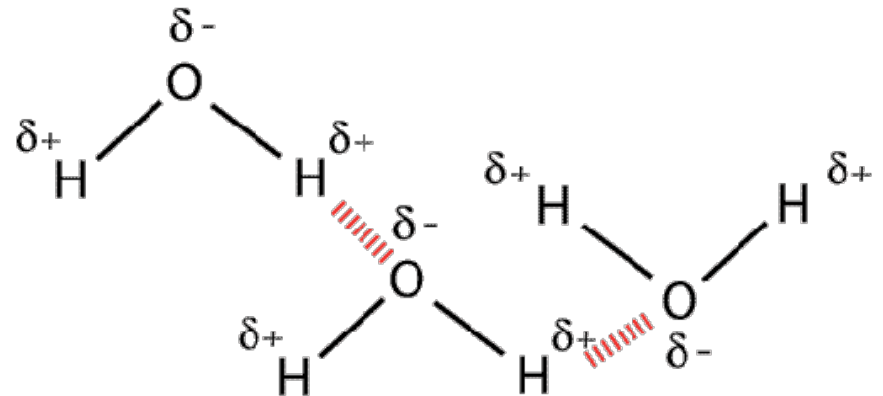
(b) octane,  $C_8H_{18}(l)$

Slide has been removed

# Hydrogen Bonds

- Strongest intermolecular force
- Are strong dipole-dipole forces that only occur between electronegative \_\_\_\_\_

• .....



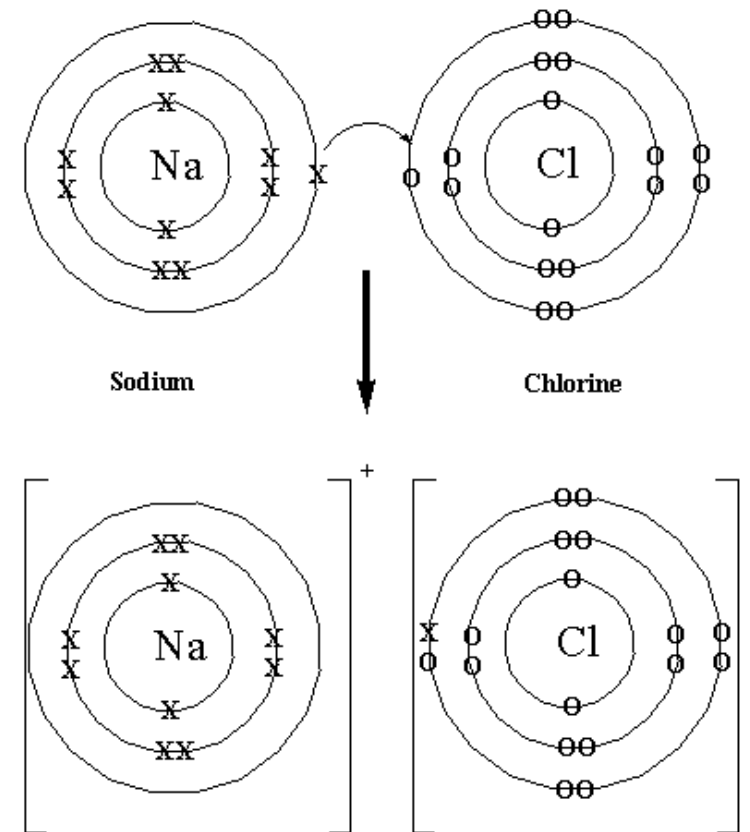
Slide has been removed

# Ionic Compounds

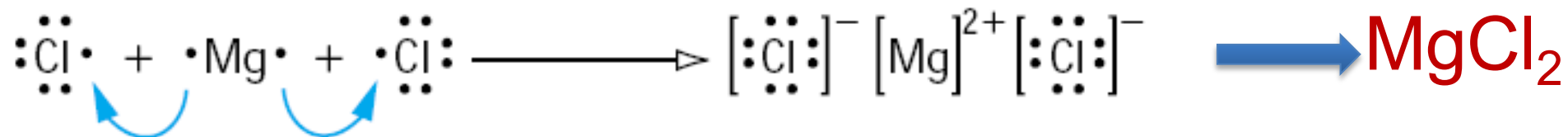
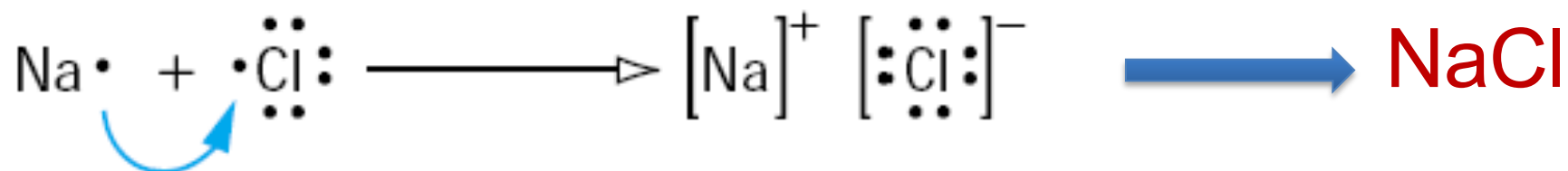
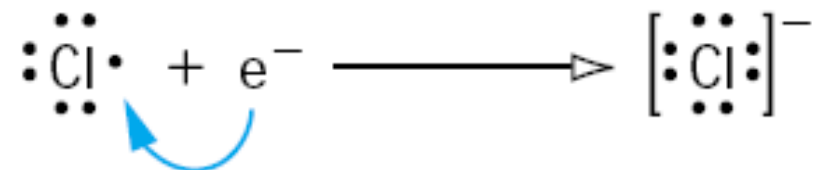
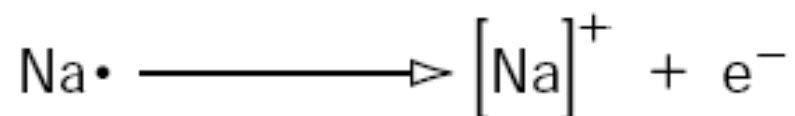
- ▶ Atom with the higher electronegativity
- 

▶ .....

- ▶ Usually a metal and a non-metal



# Forming Ionic Bonds



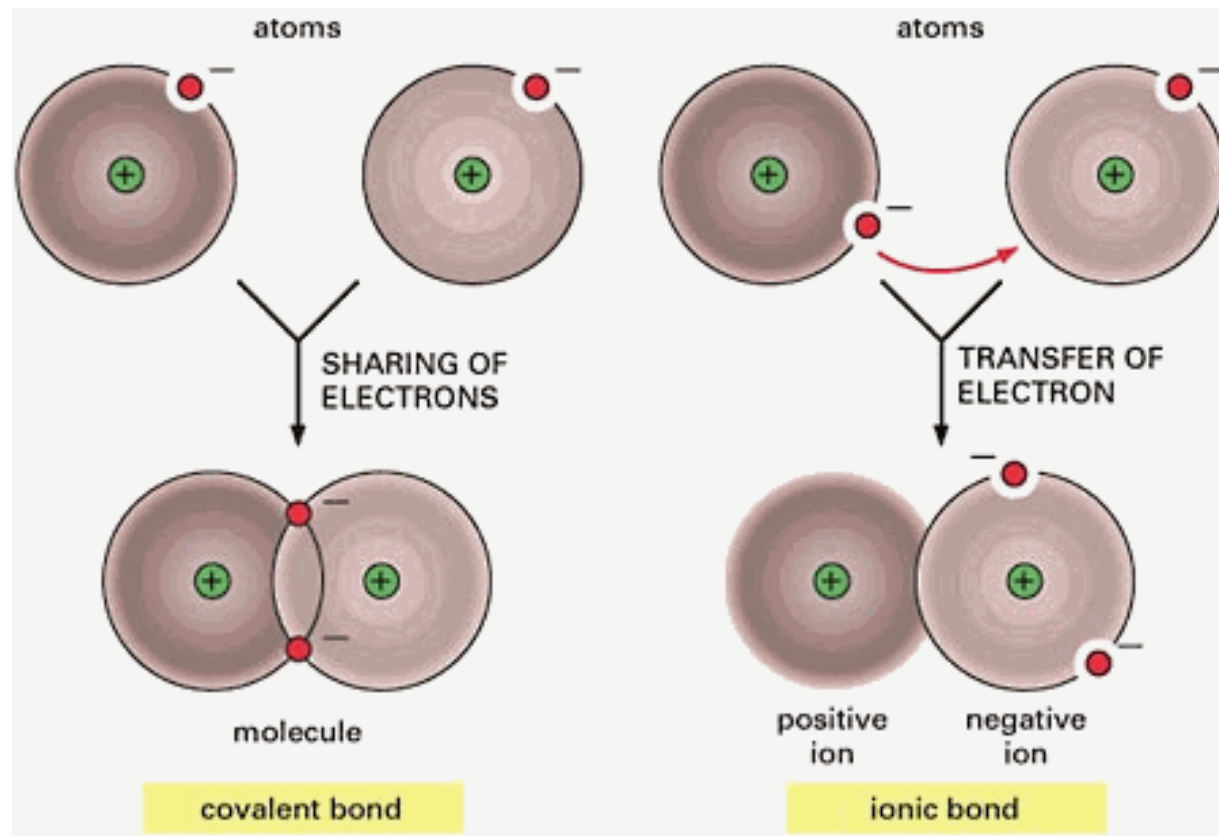
Slide has been removed

Slide has been removed

# Covalent Bonds



- Single, double, and triple bonds possible

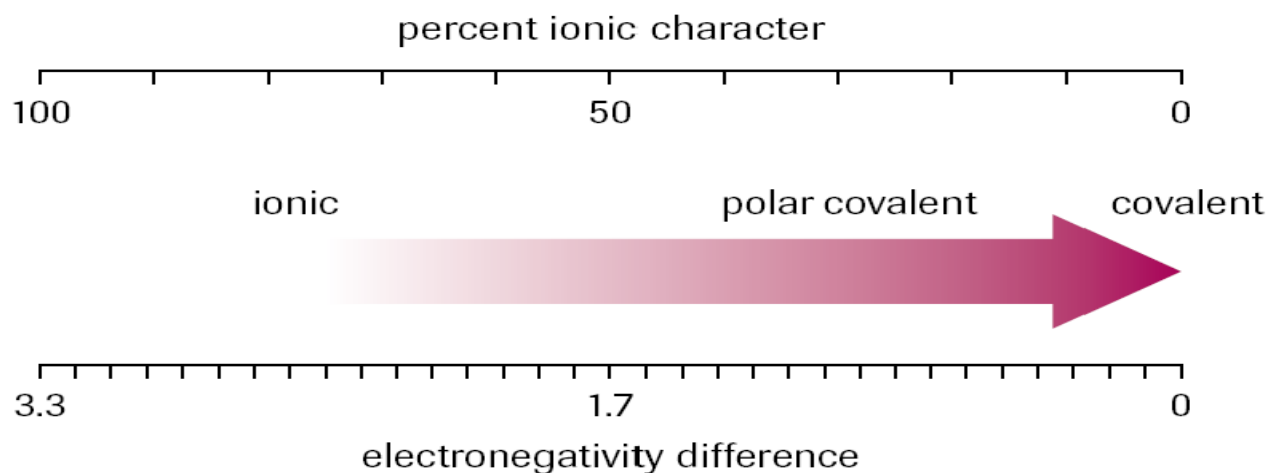


# Electronegativity

Electronegativity:                     

Each atom has an associated number –

.....



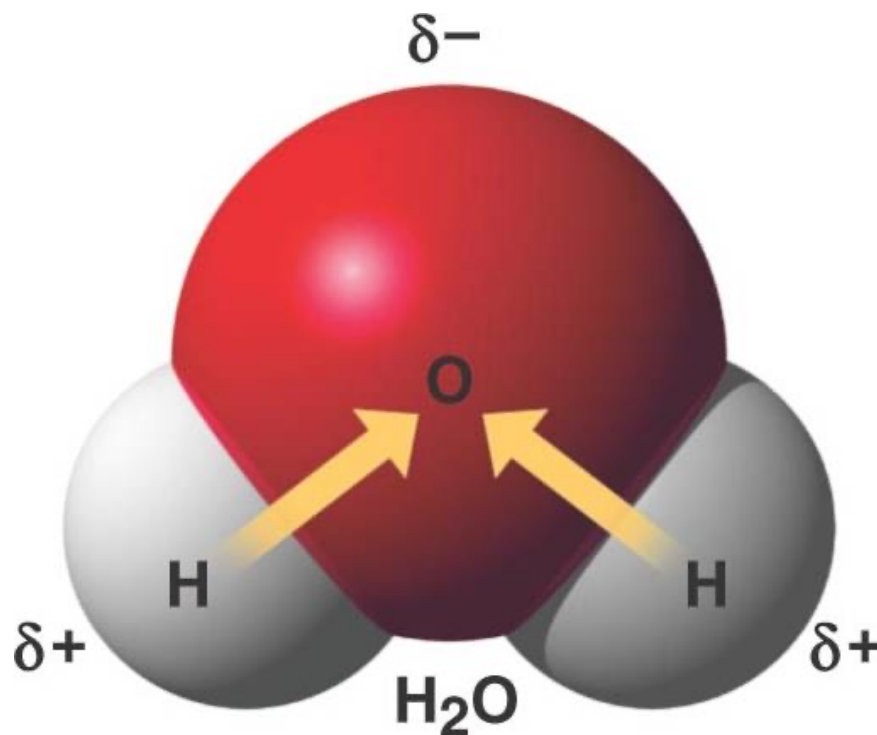
# Electronegativity

|                          |    |    |      |     |    |     |       |        |    |    |    |     |    |      |     |    |     |                           |    |               |
|--------------------------|----|----|------|-----|----|-----|-------|--------|----|----|----|-----|----|------|-----|----|-----|---------------------------|----|---------------|
| Increasing EN            |    |    |      |     |    |     |       |        |    |    |    |     |    |      |     |    |     | Highest Electronegativity |    |               |
|                          |    |    |      |     |    |     |       |        |    |    |    |     |    |      |     |    |     | VIII A                    |    |               |
| 1                        | IA | H  | IIA  |     |    |     |       |        |    |    |    |     |    | IIIA | IVA | VA | VIA | VIIA                      | He | Increasing EN |
| 2                        | Li | Be |      |     |    |     |       |        |    |    |    |     | B  | C    | N   | O  | F   | Ne                        |    |               |
| 3                        | Na | Mg | IIIB | IVB | VB | VIB | VII B | VIII B |    |    | IB | IIB | Al | Si   | P   | S  | Cl  | Ar                        |    |               |
| 4                        | K  | Ca | Sc   | Ti  | V  | Cr  | Mn    | Fe     | Co | Ni | Cu | Zn  | Ga | Ge   | As  | Se | Br  | Kr                        |    |               |
| 5                        | Rb | Sr | Y    | Zr  | Nb | Mo  | Tc    | Ru     | Rh | Pd | Ag | Cd  | In | Sn   | Sb  | Te | I   | Xe                        |    |               |
| 6                        | Cs | Ba | La   | Hf  | Ta | W   | Re    | Os     | Ir | Pt | Au | Hg  | Tl | Pb   | Bi  | Po | At  | Rn                        |    |               |
| 7                        | Fr | Rd | Ac   |     |    |     |       |        |    |    |    |     |    |      |     |    |     |                           |    |               |
| Lowest Electronegativity |    |    |      |     |    |     |       |        |    |    |    |     |    |      |     |    |     |                           |    |               |

Slide has been removed

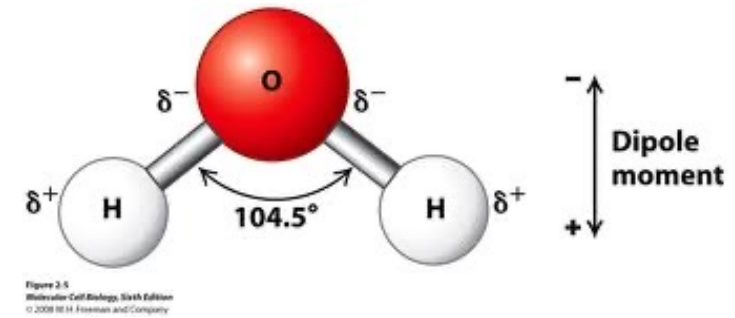
# Unequal Sharing - Polar Molecule

- e.g.  $\text{H}_2\text{O}$ 
  - Oxygen has a higher electronegativity
  - \_\_\_\_\_



Slide has been removed

# Water!!!



- Hydrogen bonds give an .....

- \_\_\_\_\_

- Water absorbs heat- hydrogen bonding causes liquid water to absorb a large amount of heat to become a vapour.

- .....

Slide has been removed

