

Activity Sheet  
Chapter 4, Lesson 6  
Represent Bonding with Lewis Dot Diagrams

Name \_\_\_\_\_

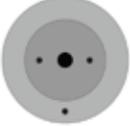
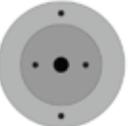
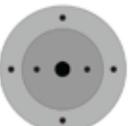
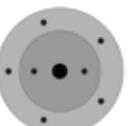
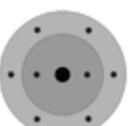
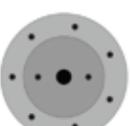
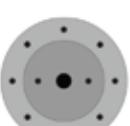
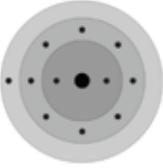
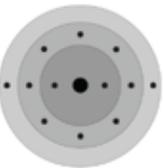
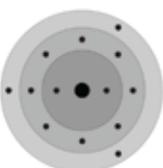
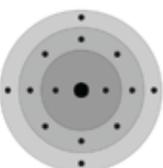
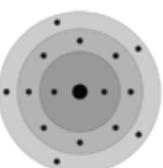
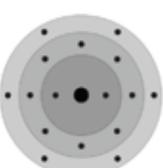
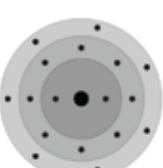
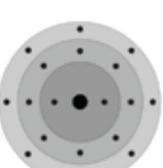
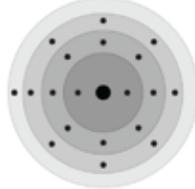
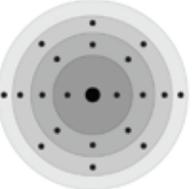
Date \_\_\_\_\_

In chapter 4, you saw energy level models for each atom that used concentric circles to represent energy levels and dots for electrons. These diagrams were also used to show what happens to the electrons when different atoms bond. Sometimes electrons were shared (covalent bonding) and sometimes electrons were transferred from one atom to another (ionic bonding).

There is a common, shorthand way to represent bonding called Lewis dot diagrams. Dots still represent electrons, but they are drawn around the symbol for the element. And only the electrons in the outermost energy level are drawn.

1. Compare the periodic table of energy levels to the Lewis dot diagrams. Look at the dots around each symbol and the energy levels in your chart. What relationship do you notice between the dots in these two charts?
  
  
  
  
  
  
  
  
  
  
2. The number of dots near hydrogen and helium are the same as in the energy level chart. Why?

# ENERGY LEVELS ELEMENTS 1-20

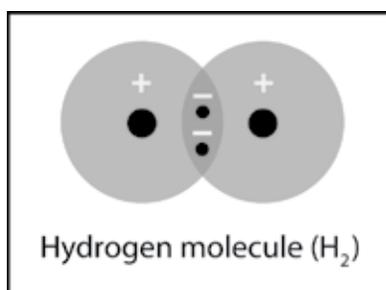
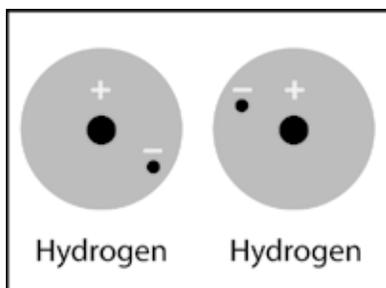
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<p><b>SODIUM</b> 11</p>  <p>22.99</p>	<p><b>MAGNESIUM</b> 12</p>  <p>24.31</p>	<p><b>ALUMINUM</b> 13</p>  <p>26.98</p>	<p><b>SILICON</b> 14</p>  <p>28.09</p>	<p><b>PHOSPHORUS</b> 15</p>  <p>30.97</p>	<p><b>SULFUR</b> 16</p>  <p>32.07</p>	<p><b>CHLORINE</b> 17</p>  <p>35.45</p>	<p><b>ARGON</b> 18</p>  <p>39.95</p>
<p><b>POTASSIUM</b> 19</p>  <p>39.10</p>	<p><b>CALCIUM</b> 20</p>  <p>40.08</p>						

# LEWIS DOT DIAGRAMS ELEMENTS 1-20

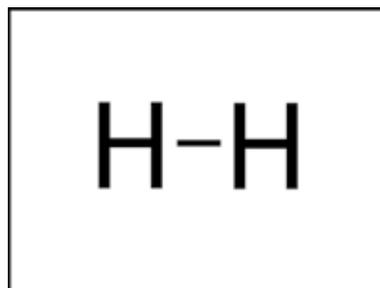
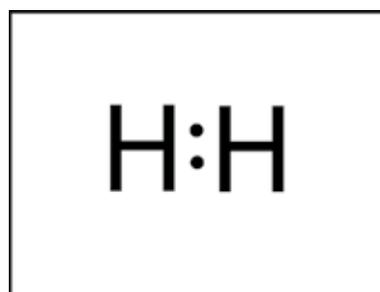
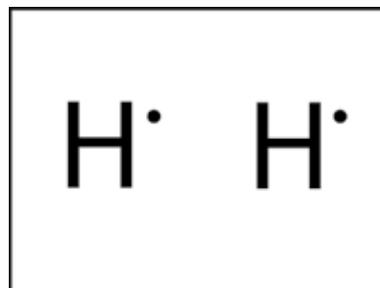
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<p>LITHIUM 3</p> <p><b>Li·</b></p> <p>6.94</p>	<p>BERYLLIUM 4</p> <p><b>Be·</b></p> <p>9.01</p>	<p>BORON 5</p> <p><b>·B·</b></p> <p>10.81</p>	<p>CARBON 6</p> <p><b>·C·</b></p> <p>12.01</p>	<p>NITROGEN 7</p> <p><b>·N·</b></p> <p>14.01</p>	<p>OXYGEN 8</p> <p><b>·Ö·</b></p> <p>16.00</p>	<p>FLUORINE 9</p> <p><b>·F·</b></p> <p>19.00</p>	<p>NEON 10</p> <p><b>·Ne·</b></p> <p>20.18</p>
<p>SODIUM 11</p> <p><b>Na·</b></p> <p>22.99</p>	<p>MAGNESIUM 12</p> <p><b>Mg·</b></p> <p>24.31</p>	<p>ALUMINUM 13</p> <p><b>·Al·</b></p> <p>26.98</p>	<p>SILICON 14</p> <p><b>·Si·</b></p> <p>28.09</p>	<p>PHOSPHORUS 15</p> <p><b>·P·</b></p> <p>30.97</p>	<p>SULFUR 16</p> <p><b>·S·</b></p> <p>32.07</p>	<p>CHLORINE 17</p> <p><b>·Cl·</b></p> <p>35.45</p>	<p>ARGON 18</p> <p><b>·Ar·</b></p> <p>39.95</p>
<p>POTASSIUM 19</p> <p><b>K·</b></p> <p>39.10</p>							<p>CALCIUM 20</p> <p><b>Ca·</b></p> <p>40.08</p>

## Covalent bonding in the hydrogen molecule, $H_2$

Energy level model



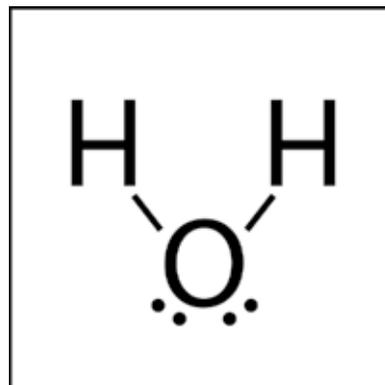
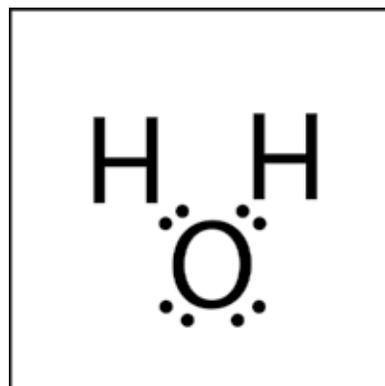
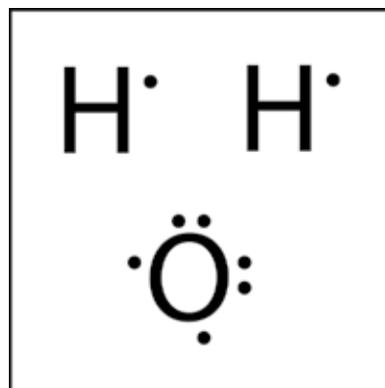
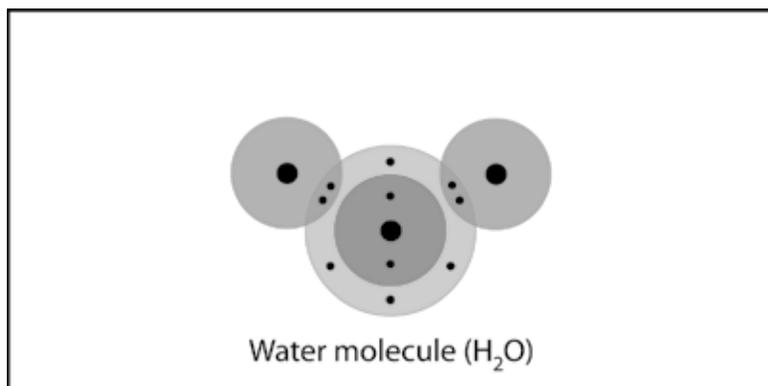
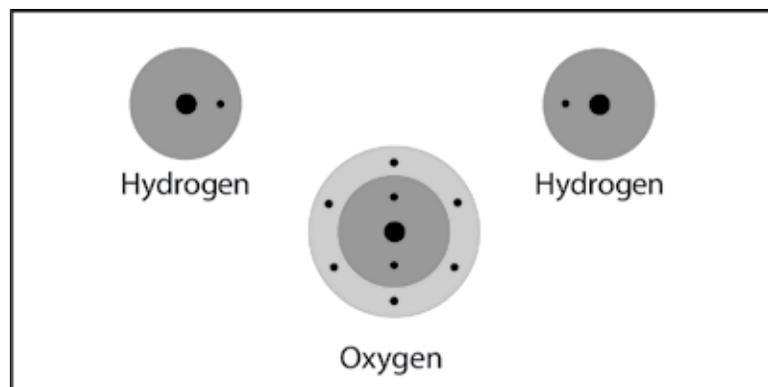
Lewis dot model



3. What do the pair of dots between the two letters "H" represent?

4. What does the line between the two letters "H" represent?

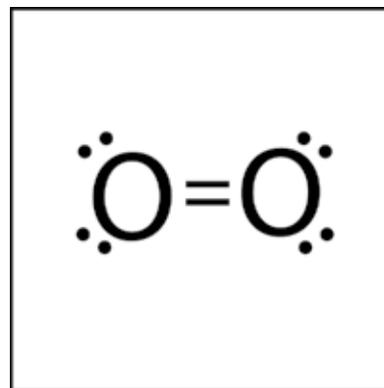
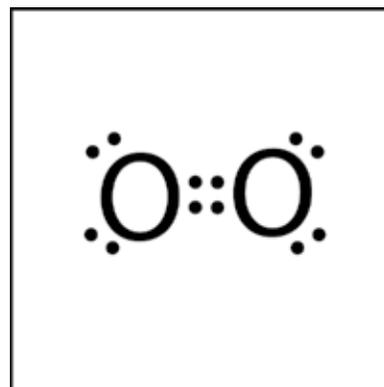
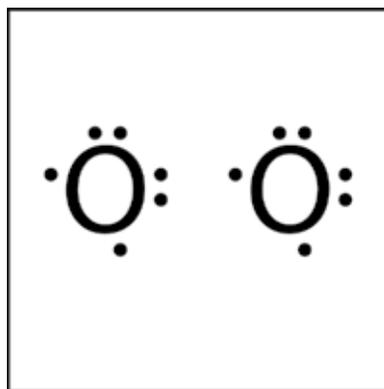
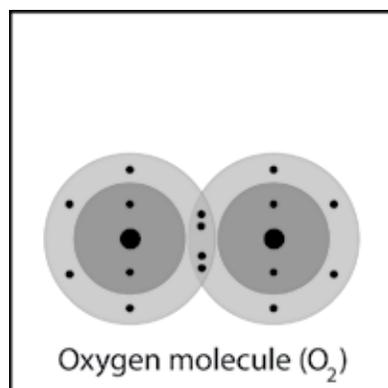
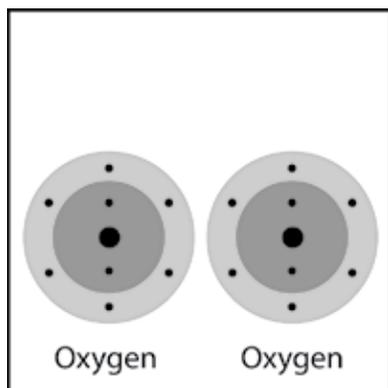
## Covalent bonding in the water molecule, H<sub>2</sub>O



5. Water has two hydrogen atoms covalently bonded to an oxygen atom. Methane has four hydrogen atoms covalently bonded to a carbon atom.

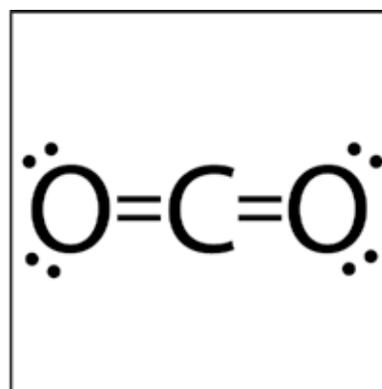
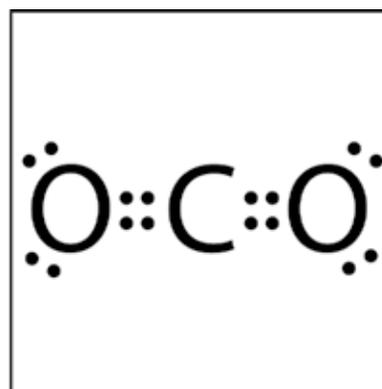
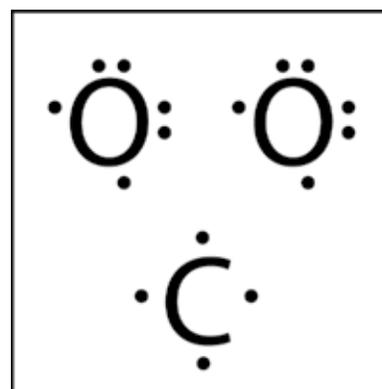
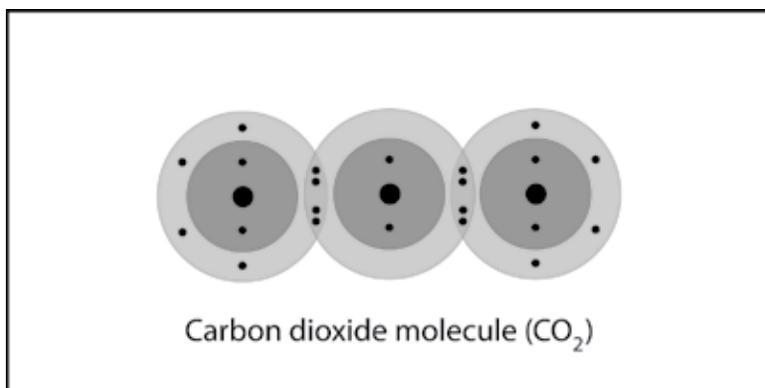
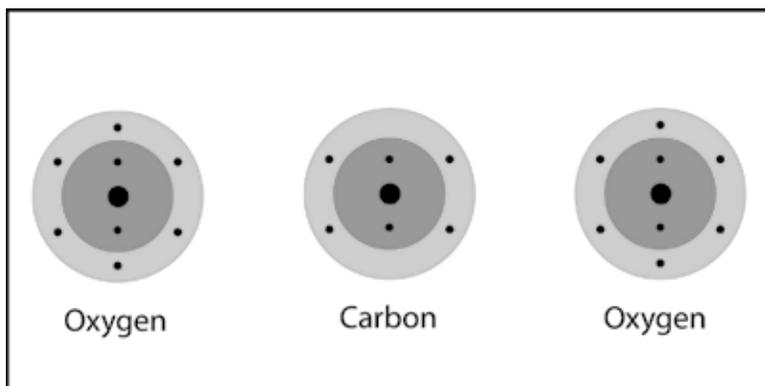
Draw Lewis diagrams for methane using dots for pairs of electrons and then lines for pairs of electrons.

Covalent bonding in the oxygen molecule, O<sub>2</sub>



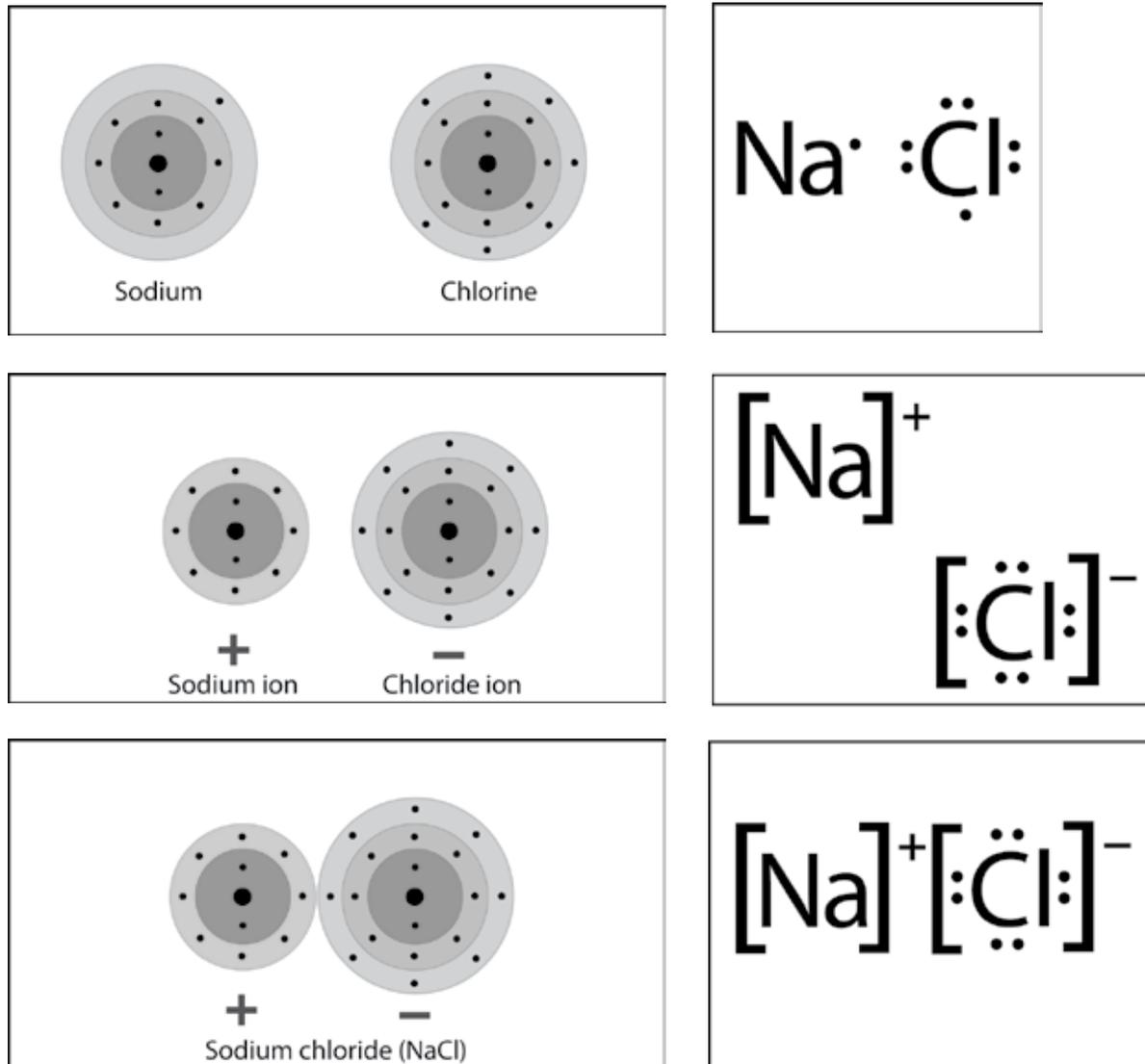
6. Why are there four dots between the two oxygen atoms?

Covalent bonding in the carbon dioxide molecule, CO<sub>2</sub>



7. Why are there two sets of lines between the carbon and each oxygen atom?

## Ionic bonding of sodium chloride, NaCl



8. In the second dot diagram, why are there no electrons surrounding sodium?
9. In the final dot diagram of NaCl, the dots between the sodium and chlorine are between the atoms. Are these atoms sharing the electrons?