Lesson 7

Chemistry 0

Fall 2021, L. Tracey Gao

Summary from last lesson

- There are two main classes of elements:
  - Elements that tend to lose valence electrons- Metal
  - Elements that tend to gain electrons- Nonmetal
- ***Metal*** atoms donate all of their valence electrons to ***nonmetal*** atoms and all the atoms get their outer shells filled. After the electron transfer, the oppositely charged ions attract, and forming an **ionic bond**.
- ***Nonmetals*** bond with other ***nonmetals*** **covalently** by sharing electrons so that both atoms have a sense of having a filled outer shell.

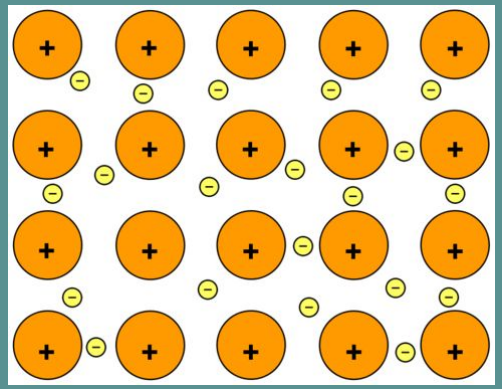
Week 6 Homework

https://docs.google.com/forms/d/1EqYyWjZZv8OX6aipwV-vIrBF0N94rJFSrBrgjRd5mUc/edit

Previous question

Metal- Non Metal: Ionic Bonding
Non Metal- Non Metal: Covalent Bonding

What about Metal- Metal?



https://chem.libretexts.org

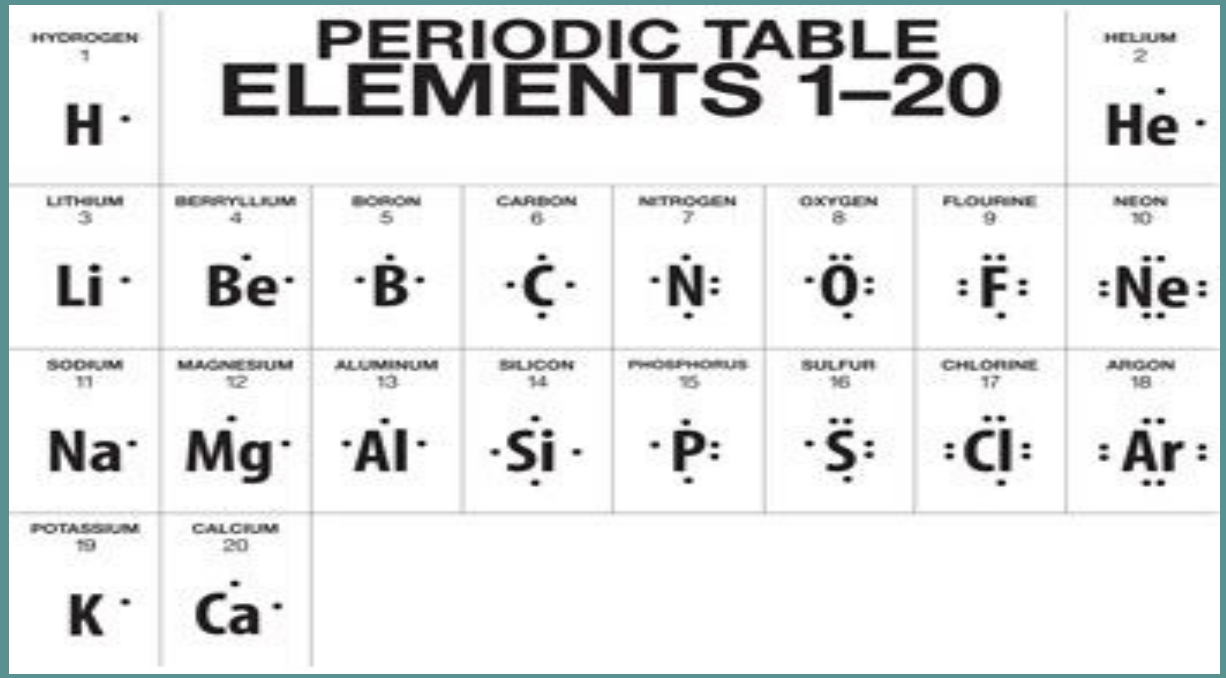
Lewis dot structures

- One popular method of representing atoms is through **Lewis dot diagrams**. In a dot diagram, only the symbol for the element and the electrons in its outermost energy level (valence electrons) are shown.

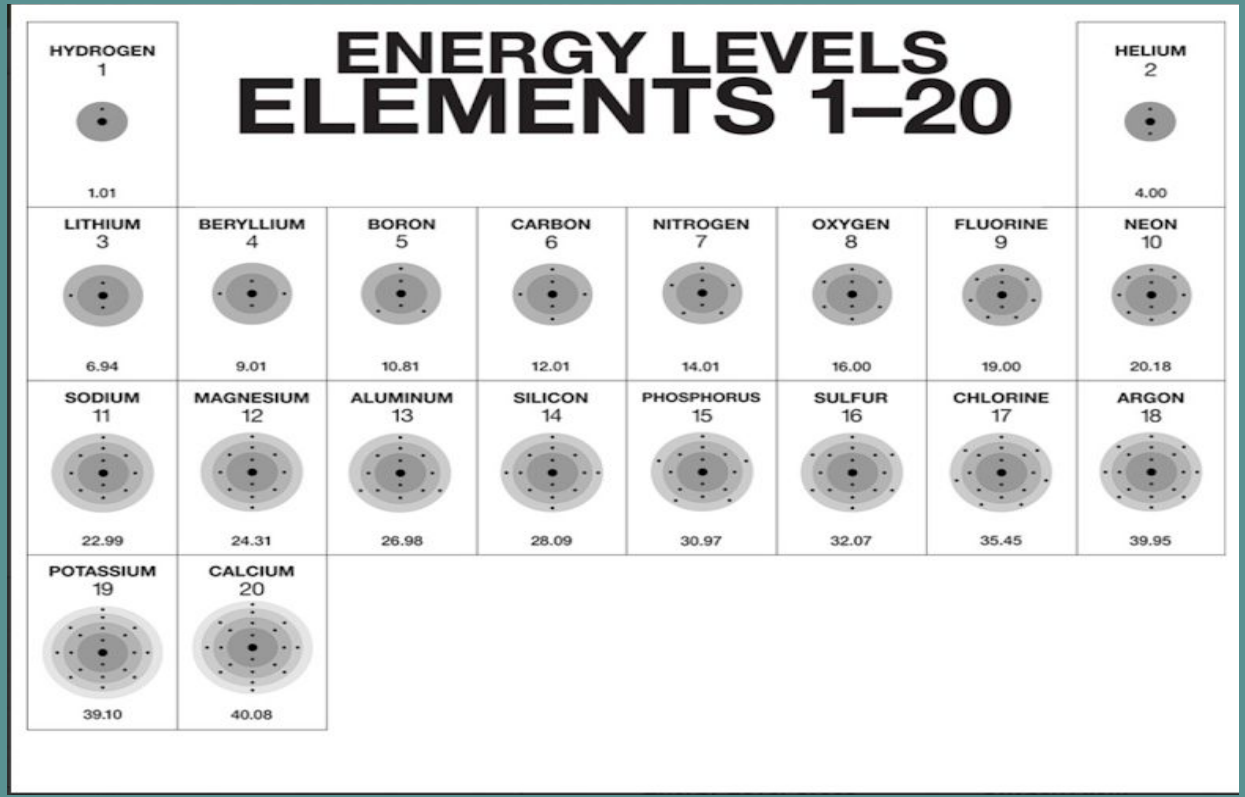
Lewis dot structures

- A Lewis dot structure is like a simplified electron energy level model.
- The Lewis structure contains the element symbol with dots representing electrons.
- The only electrons shown are those on the outer energy level or valence electrons.
- The electrons are placed around the element symbol, one at a time, clockwise or counterclockwise, and then grouped in pairs as more electrons are added.

Lewis dot structures



Energy Levels Model

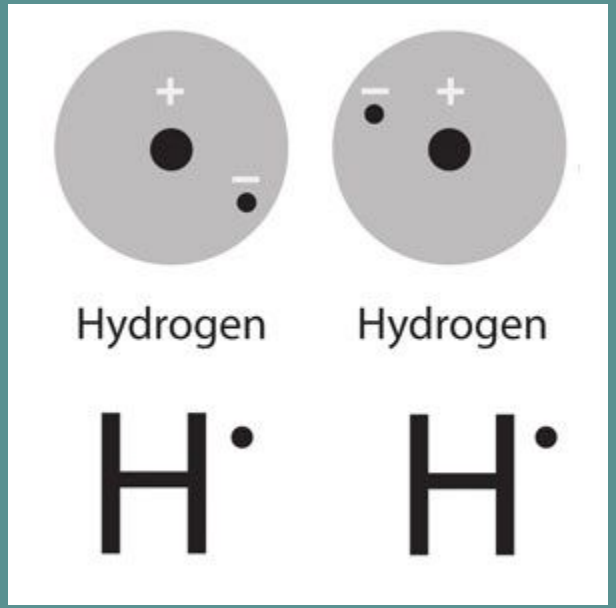


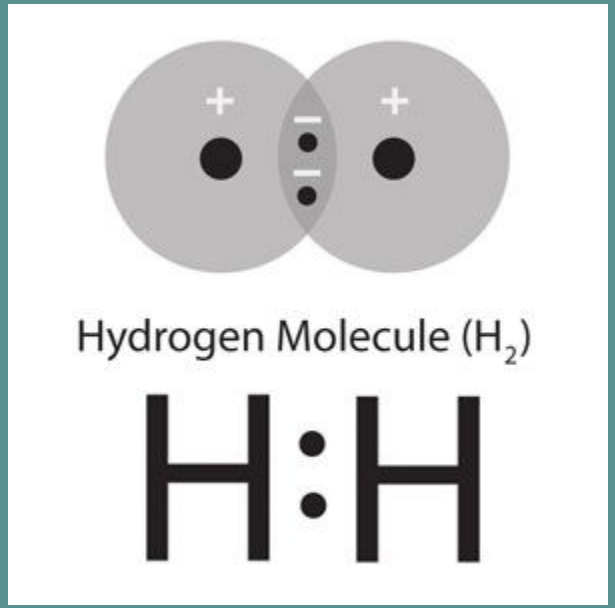
Questions

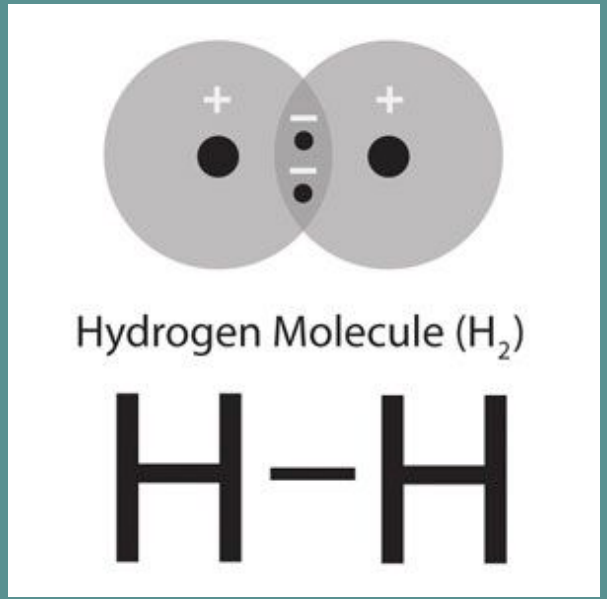
- Compare the dots around each symbol with the energy levels in your chart. What relationship do you notice between the dots in these two charts?

- The number of dots near hydrogen and helium are the same as in the energy level chart. Why?

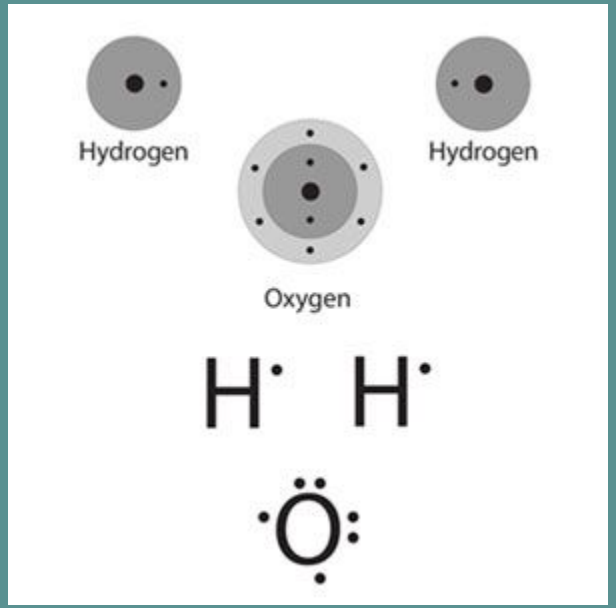
Covalent bonding in Hydrogen

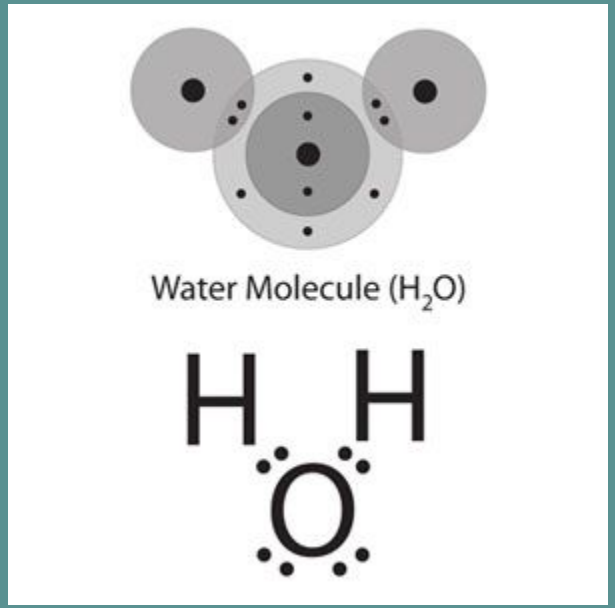


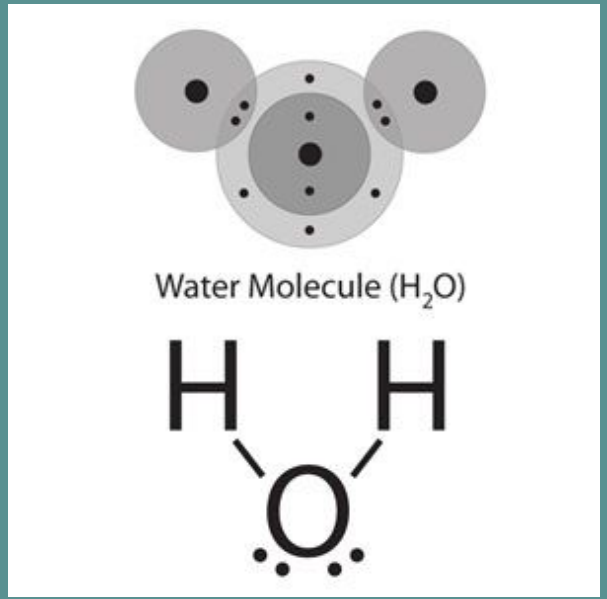




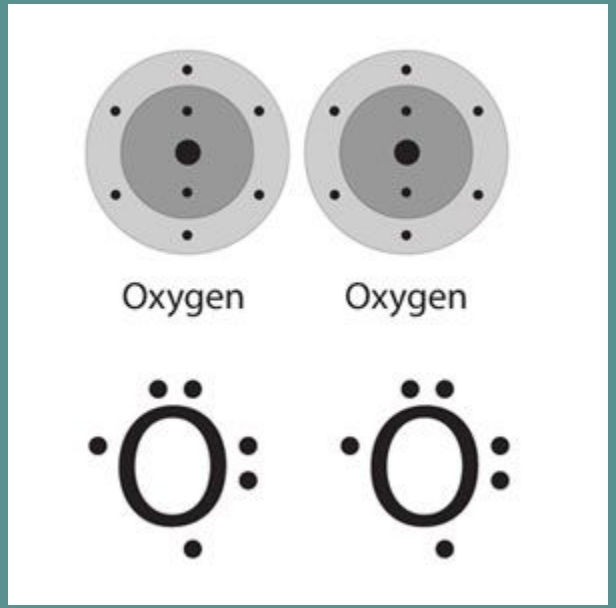
Covalent bonding in Water

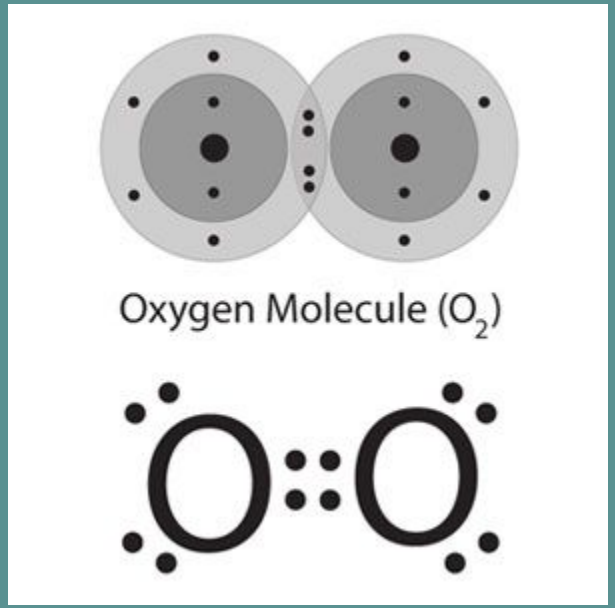


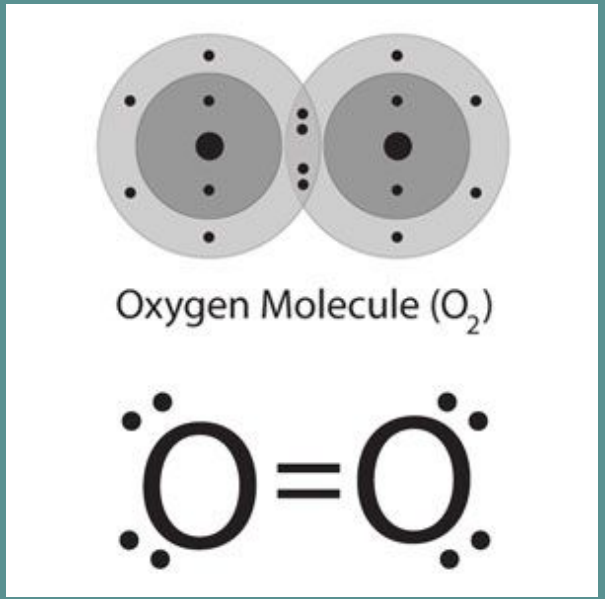




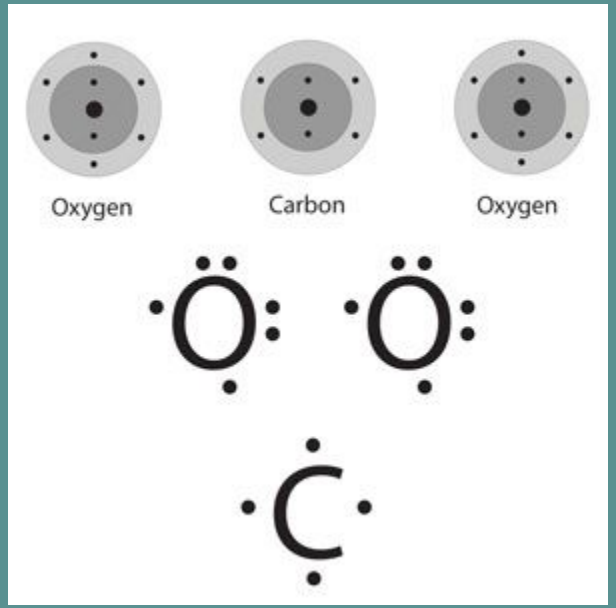
Covalent bonding in Oxygen

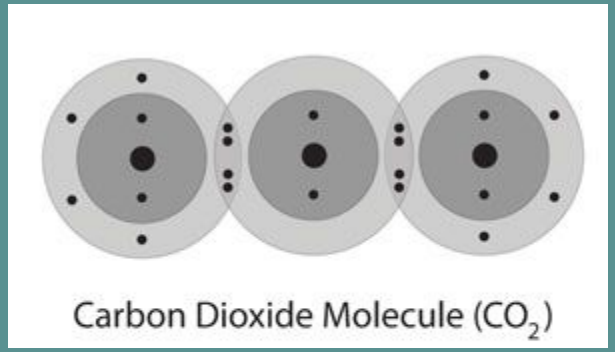




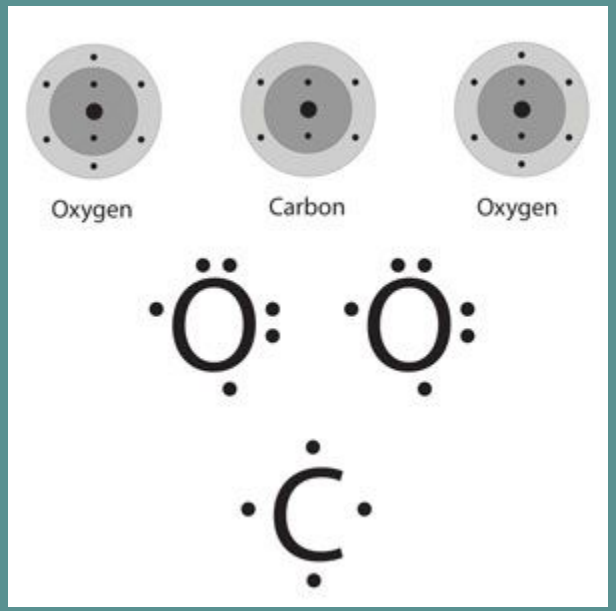


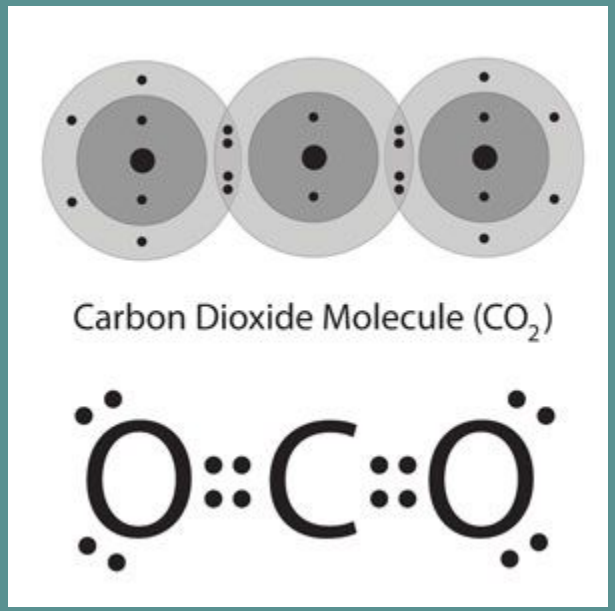
Exercise: Covalent bonding in CO_2

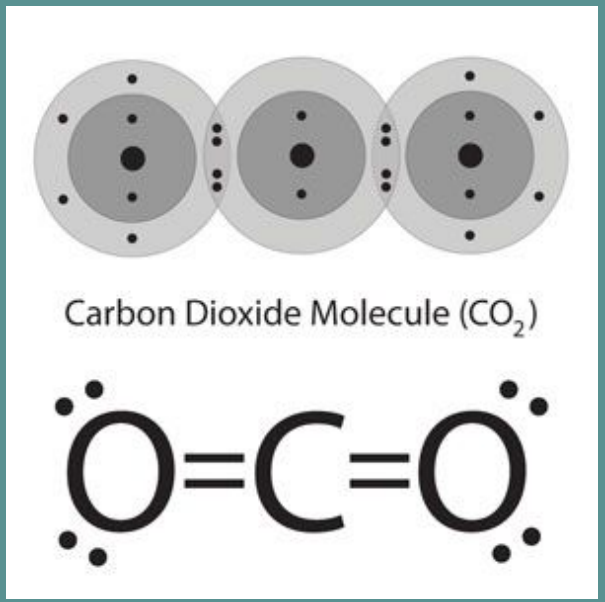




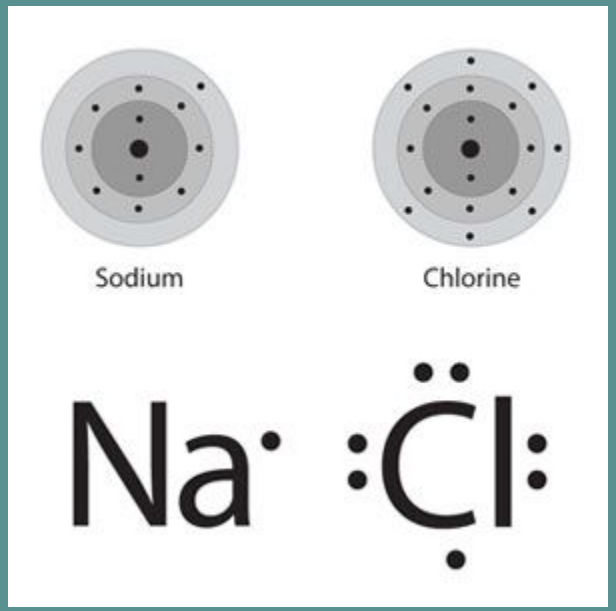
Exercise: Covalent bonding in CO_2

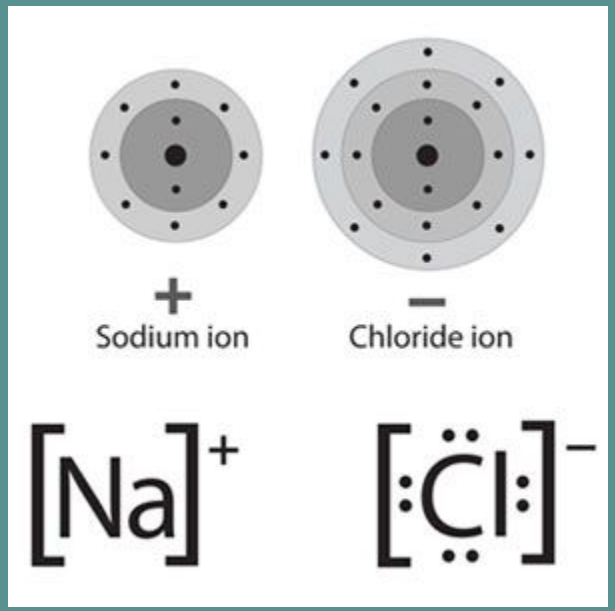


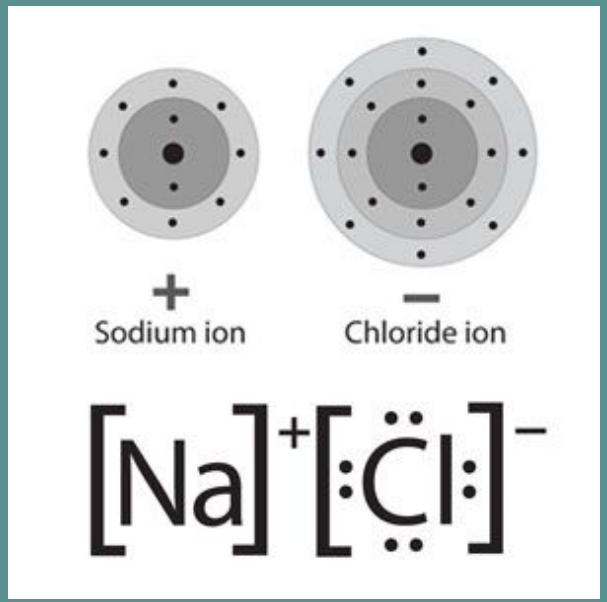




Ionic Bond in Sodium Chloride





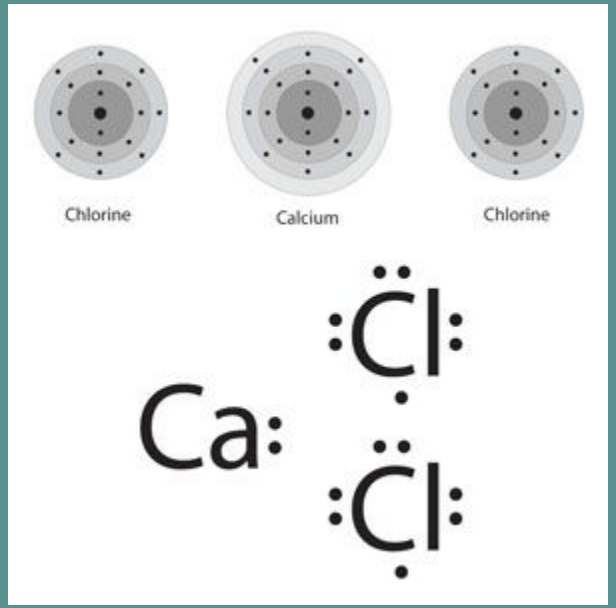


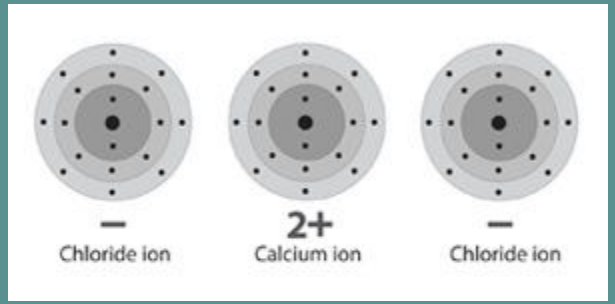
Questions

- In the second dot diagram, why are there no electrons surrounding sodium?

- In the final dot diagram of NaCl, the dots between the sodium and chlorine are between the atoms. Are these atoms sharing the electrons?

Exercise: Ionic Bond in Calcium Chloride





Exercise: Ionic Bond in Calcium Chloride