

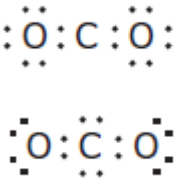
Lesson Summary: TEKS 7.C: Construct Electron Dot formulas to illustrate ionic and covalent bonds (RS)

Pre-requisite knowledge: Valence electrons (definition and how to determine); Lewis dot structure for individual atoms; Bohr Model of atom; periodic trends (especially electronegativity); awareness of what an “ion” is – helpful but not necessary

| 5E | Objective | Activity | Supplies Needed |
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| ENGAGE | <ul style="list-style-type: none"> • Develop a “need to know” for why most elements bond, but some do not • Laying a foundation for Octet Rule & definition of bonding – but not defining either YET | <ul style="list-style-type: none"> • Pics of everyday objects that are compounds, mixtures • A few pics of noble gases • Formation of NaCl video <ul style="list-style-type: none"> ○ Students create an Observation / Conclusion chart to record observations from video ○ Conclusions – students can make initial conclusions from video; but these should be re-visited after the Explain • Discussion of pics & video <ul style="list-style-type: none"> ○ Why do most things in our world occur as compounds or mixtures? ○ Why do we not see more elements in their “pure” form? ○ Which elements typically occur naturally? | <ul style="list-style-type: none"> • Pictures • NaCl Video: http://www.youtube.com/watch?v=2mzDwgyk6QM |
| EXPLORE 1 | <ul style="list-style-type: none"> • Understand that chemical formulas represent 3-d structures • Make connection between the “holes” in the spheres, the | <ul style="list-style-type: none"> • Students build the following compounds and answer the guiding questions: <ul style="list-style-type: none"> ○ CH₄ ○ NH₃ ○ H₂O ○ CO₂ ○ NaCl ○ MgCl₂ | <ul style="list-style-type: none"> • Modeling sets • Guiding questions |

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| | number of bonds formed, and number of electrons needed to achieve a “full octet” | **we’re not worried at this time about representing ionic & covalent bonds with the same model – important piece here is for students to understand what a bond is; also important to understand how the number of bonds formed connects with valence electrons | |
| EXPLAIN 1 | <ul style="list-style-type: none"> Define Octet Rule (and it’s exceptions with respect to H and He) Define Bond | <ul style="list-style-type: none"> Discuss guiding questions and develop concept map as a class Frayer model Octet Rule <ul style="list-style-type: none"> Example / non – example Def Use in a sentence to explain example & non-example Students create analogy for definition of the word “bond” “A bond is like _____ because they both _____” Teacher model with example for Octet Rule “The octet rule is like 8 hours of sleep; atoms need 8 valence electrons to be stable and satisfied and not reactive and I need 8 hours of sleep to be stable and satisfied and not reactive!” | <ul style="list-style-type: none"> Short reading passage over bonds & octet rule Paper for frayer model Manipulative pieces for Concept map |
| EXPLORE 2A | <ul style="list-style-type: none"> Discover patterns for 2-D representation of compounds (Lewis Dot Structures – start with a focus only on covalent compounds) | <ul style="list-style-type: none"> Have models next to posters Observe posters of Lewis Dot structures – only covalent compounds to start <ul style="list-style-type: none"> “I notice...” “I wonder” | <ul style="list-style-type: none"> Models of compounds Posters of Lewis Dot Structures Post it notes |
| EXPLORE 2B | <ul style="list-style-type: none"> Discover the connection between valence electrons and bonding | <ul style="list-style-type: none"> Students write Lewis dot structures for the following elements – 1 element / transparency square: <ul style="list-style-type: none"> C | <ul style="list-style-type: none"> Transparencies of elements Expo markers |

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| | <ul style="list-style-type: none"> Discover how to create Lewis dot structures for compounds based on Lewis Dot Structures for elements | <ul style="list-style-type: none"> H x 4 O N Mg Cl x 2 Na Students create Lewis Dot structures for various compounds using transparencies and writing down the structures they create in their notebooks | |
| EXPLAIN 2 | <ul style="list-style-type: none"> Develop rules for making Lewis Dot structures Understand the “line” and “shared dots” both represent a bond | <ul style="list-style-type: none"> Discussion to develop rules for writing Lewis Dot structures Show both types of Lewis Dot structures on posters Practice drawing a few compounds as a class using white boards | <ul style="list-style-type: none"> Lewis Dot structure posters White boards for class practice |
| ELABORATE | <ul style="list-style-type: none"> Develop an understanding that there are 2 main types of bonds: covalent and ionic Understand the differences between ionic and covalent compounds Understand how to represent ionic bonds with Lewis structures | <ul style="list-style-type: none"> Return to ENGAGE video of formation of NaCl Explain that the bond between Na and Cl is created in a different way than the bond between C & O in CO₂ Show the difference in conductivity btwn salt & sugar solutions Use PHET simulation to highlight that salt breaks into ions & sugar doesn't <ul style="list-style-type: none"> Venn diagram of covalent & ionic bonds: <ul style="list-style-type: none"> Both: force that holds atoms together Both: involve valence electrons Both: goal is for atoms to become like Noble Gases Ionic: complete transfer of electrons Covalent: share electrons | <ul style="list-style-type: none"> Formation of NaCl video from Engage Phet Simulation – Sugar and Salt Solutions: http://phet.colorado.edu/en/simulation/sugar-and-salt-solutions Lewis Dot Structure Posters for Covalent and Ionic Compounds Post it notes |

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| | | <ul style="list-style-type: none"> • Define Ion • Compare posters for Lewis Dot Structure for ionic compounds to Lewis Dot Structure for covalent compounds <ul style="list-style-type: none"> ○ Have students do an “I notice”, “I wonder” gallery walk again ○ Add these similarities / differences to Venn Diagram • Good place to spiral review electronegativity values & trend as connected with bond types • | |
| EVALUATE | <ul style="list-style-type: none"> • Students write Lewis Dot Structures for Covalent and Ionic compounds | <ul style="list-style-type: none"> • Writing Prompt: “Explain how understanding the number of valence electrons in an atom can help predict bonds it will form.” • Writing Prompt: “Explain why Lewis Dot Structures are more useful than just the chemical formula.” • Practice identifying correct Lewis Dot structures • Explain why the following Lewis Dot Structures are not correct: <div style="text-align: center;">  </div> | <ul style="list-style-type: none"> • |