

Module 5.2: Electronegativity and Polarized Bonds

Learning Objectives

Upon successful completion of this sub-module, students will be able to:

- LO 5.2.1 Explain the polarization of electron density caused by electronegativity differences of atoms in a covalent bond.
- LO 5.2.2 Define partial charges on atoms.
- LO 5.2.3 Understand how to represent bond dipole moments with crossed arrow notation.
- LO 5.2.4 Predict bond moment magnitude using the Pauling Electronegativity scale.
- LO 5.2.5 Describe the type of bond between two atoms: non-polar covalent, polar covalent or ionic.

Prior Knowledge Review

- [Module 5.1: Lewis Structures of Simple Molecular Compounds](#)

Instructional Materials

Textbook Sections

- OpenStax Chemistry Atoms First 2e
 - [7.6 Molecular Structure and Polarity](#) (LO 5.2.1-5.2.5)
- Libretext - A Molecular Approach (Tro)
 - [9.6: Electronegativity and Bond Polarity](#) (LO 5.2.1-5.2.5)

Videos Resources

- [Electronegativity and polar covalent bonds](#) (LO 5.2.1-5.2.4)

- Description: This video clip (0:00-4:47) shows how to classify different types of bonds using differences in electronegativity and how to show a dipole moment using a vector pointing to the more electronegative atoms.
 - License: By Patreon.com/TheScienceClassroom used under a standard Youtube license.
- [Polar or non-polar covalent bonds](#) (LO 5.2.1-5.2.5)
 - Description: This video clip (0:00-10:24) shows how to classify different types of bonds using differences in electronegativity and how to show a dipole moment using a vector pointing to the more electronegative atoms. This video has more examples than the one above.
 - License: By Sciencepost used under a standard Youtube license.
- [Polarizing power and covalent bonds](#) (LO 5.2.4)
 - Description: This video clip (0:24-2:35) discusses polarizability based on ionic size and number of electrons.
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Other Resources

- Calculator: [Chemical Bond Polarity Calculator](#) (LO 5.2.1-5.2.5)
 - Description: This website calculates the difference in electronegativity between any two atoms.
 - License: By Calculators.live. All rights reserved but open to use by students and instructors.

Activities and Assessments

Study Guides / Worksheets

- Worksheet: [Lewis Structures and Bonding](#) (LO 5.2.1-5.2.5)
 - Description: This worksheet includes problems requiring calculations of differences in electronegativity to determine the type of bond.

- Teaching Tip: This worksheet includes problems from earlier and later material will likely need to be edited. Appropriate problems start at problem #12.
- Answer Key: [Lewis Structures and Bonding - Key](#) (LO 5.2.1-5.2.5)
- License: By Dr. Christine Yerkes and the Department of Chemistry at the University of Illinois Urbana-Champaign ([Dr. Yerkes' website](#)) used with permission. Please attribute upon use.

Textbook Exercises

- [Openstax - Atom First 2e - Chapter 4](#) (LO 5.2.1-5.2.5)
 - Description: These end-of-chapter exercises cover all the topics in the chapter and include several exercises.
 - Teaching Tip: Solutions are not provided for the even-numbered exercises which might be used in assessment.
 - Access: On-line only (Neither downloadable nor editable).
 - Answer Key: The odd-numbered exercises are provided. The direct link to the solutions does not work but one can click on any odd-numbered questions to get to the solutions page.
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