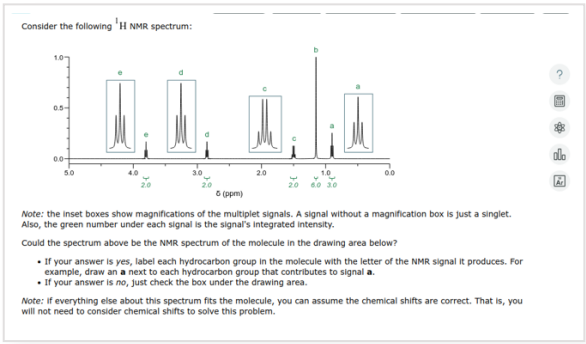
ALEKS for Organic Chemistry

New ALEKS Topics Coming Summer 2025

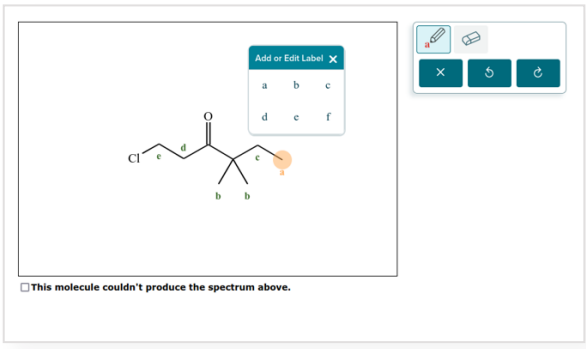
New Topics on spectroscopy including ^{1}H NMR, ^{13}C NMR, IR, and mass spectrometry and combined spectra-structure rationalization for ALEKS Organic Chemistry will be released in June 2025. In ALEKS, all spectra are simulated with 100s of instances, which means more practice with realistic problems for your students and less stress about cheating for you.

Highlights at a Glance:

- ALEKS Topics are algorithmic, providing 100s of instances for students to practice.
- Each ALEKS Topic has a corresponding unique Explanation, which walks students through the answer in step-by-step detail.
- By simulating spectra, the ALEKS Content Architects have created realistic spectra that doesn't correspond exactly with published spectra, making it difficult for students to do an internet image search on ALEKS spectra to solve ALEKS spectroscopy problems via homework help platforms like Chegg or generative AI tools like ChatGPT.
- Mirroring how one will label spectra in lab, an easy-to-use Labeling function has been added to the ALEKS Drawing Tool.



An example of a simulated H1NMR spectrum



Labeling molecular features directly on Lewis structures in ALEKS

New ALEKS Topics Coming Summer 2025*

*This date is subject to change, as is the Topic list below, based on developmental progress

Section 7.1 Mass Spectrometry

- Determining the degree of unsaturation for a hydrocarbon from its molecular formula
- Determining the degrees of unsaturation in a hydrocarbon
- Determining the degrees of unsaturation in a complex organic molecule based on its molecular formula
- Determining the degrees of unsaturation in a complex organic molecule
- Identifying the different components of a mass spectrum
- Determining plausible molecular formulas based on mass spectrum data

Section 7.2 NMR Spectroscopy

- Understanding terms used to describe NMR spectra
- Converting chemical shift to absorption frequency
- Identifying the protons with unique NMR signals in a simple molecule
- Identifying the protons with unique NMR signals in a molecule with a double bond
- Identifying the protons with unique NMR signals in a molecule with a ring
- Predicting the relative chemical shift of protons
- Using integrated intensities in NMR spectra
- Predicting NMR signal multiplicity for a selected proton
- Identifying protons from their NMR signal multiplicity
- Determining the stereochemistry of a double bond from its NMR spectrum
- Identifying a structure from its NMR spectrum

Section 7.3 IR Spectroscopy

- ochem520 "Understanding terms used to describe IR spectra
- Interconverting IR absorption location and transition energy
- Understanding how the character of a bond determines IR stretch absorption frequency
- Understanding the effect of carbon hybridization on IR stretch absorption frequency
- Understanding the effect of resonance on IR stretch absorption frequency
- Interpreting the functional group region of an IR spectrum
- Drawing a structure consistent with an IR spectrum

Section 7.4 C13 NMR Spectroscopy

- Identifying the carbons with unique C13 NMR signals
- Predicting chemical shifts of carbon signals in C13 NMR
- Comparing the number of unique carbon signals in C13 NMR in between structures
- Determining a molecular structure based on C13 NMR

Section 7.5 Structure Spectra Relationships

- Determining molecular formula from mass spec and IR spectroscopy data
- Using combined spectral data to identify a simple organic compound
- Using combined spectral data to identify a complex organic compound

Section 11.3 Acetylide Reactions

- Designing a short synthesis using one acetylide reaction
- Designing a short synthesis starting from acetylene