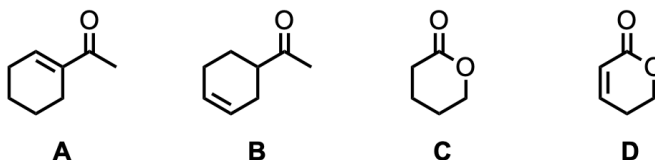


# Infrared Spectroscopy Worksheet

## Warm-Up Questions:

Watch the [Khan Academy videos](#) on IR spectroscopy.



All of the molecules shown above absorb IR radiation in the range between 1600 and 1850  $\text{cm}^{-1}$ . In each molecule:

1) Label the functional groups that are present.

2) Identify the specific bond(s) responsible for the absorption(s) and predict the approximate wavenumber of absorption for each of these bonds.

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## Fundamental Vibrational Modes of Water:

Take screenshots of all three vibrational modes of water:

Bending	Symmetric Stretching	Antisymmetric Stretching

Take a screenshot of the predicted gas phase IR spectrum of water:

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## IR-active versus IR-inactive:

Take screenshots of all seven vibrational modes of acetylene:

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Take a screenshot of the predicted gas phase IR spectrum of acetylene:





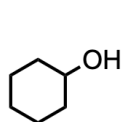


## Individual Exercise:

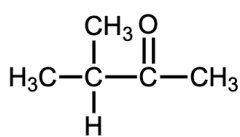
Two infrared spectra are shown, corresponding to two of the following compounds. Match the corresponding structure to each IR spectrum by:

- 1) Identifying how the major peaks (above  $1500\text{ cm}^{-1}$ ) in each spectrum correspond to the structure you have chosen
- 2) Using molecular modeling to perform a vibrational analysis with Maestro to confirm your answers

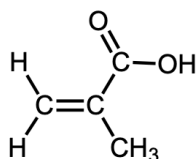
### Structure Bank:



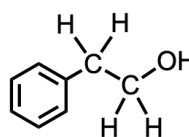
1



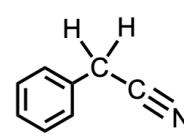
2



3

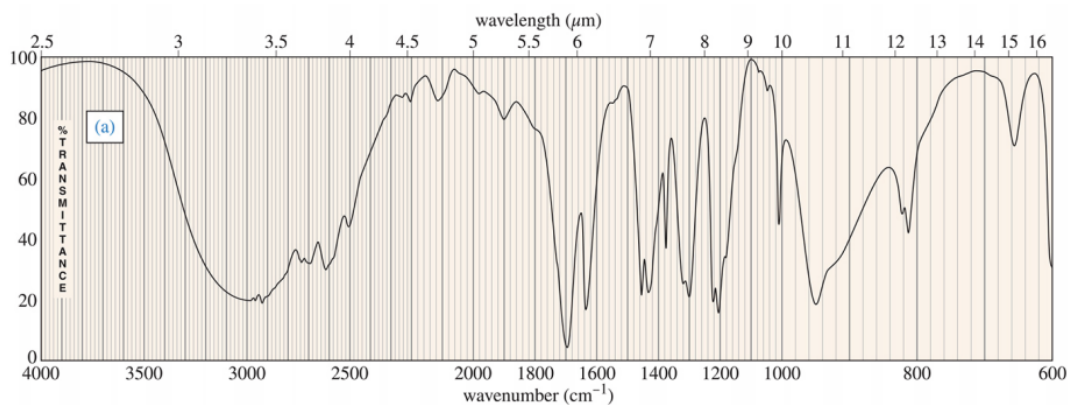


4



5

### IR Spectrum A:



## IR Spectrum B:

