



Research Journal



Use your Research Readings and relevant information from additional literature review to answer the following research and data analysis questions. Use the information in your answers to help you write your final report.

Research Questions

Answering the following questions will help you identify the qualities to look for in a planet that may harbor life.

- 1 What gases does life (as it is currently understood) require? What gases does life produce?
- 2 What is the difference between a terrestrial planet and a Jovian planet?
- 3 What does it mean for a planet to be in the “habitable zone”?
- 4 Which planets in our solar system are in (or near) the habitable zone?
- 5 How does the chemical composition of the terrestrial planet atmospheres differ from the composition of the Jovian planet atmospheres?
- 6 Why is it important to look at Archean Earth?

Data Analysis Questions

Answering the following questions will help you analyze the spectra.

- 1 Which gases, if any, are common to all four planet spectra?
- 2 What does your answer to question 1.) mean in terms of the search for life on other planets?
- 3 If ozone (O_3) is found, is normal oxygen (O_2) also present? Does the presence of oxygen automatically mean life?
- 4 How does the spectrum of Archean Earth compare to that of present-day Earth? Why is it important to consider the atmosphere of Archean Earth when considering how to look for life on other worlds?
- 5 What gases are likely to be present in the atmosphere of a planet harboring life? Is the answer different depending on whether it is primitive life or complex life?
- 6 Can the infrared portion of a planetary spectrum be used to look for biomarkers (signs of life)? What spectral features are of interest for this?



Final Report Requirements

Research and prepare a final report in which you identify the characteristics of planets with the best chances of harboring life, and explain how scientists hope to use planetary spectra to search for extrasolar life.

Here are some specific ideas to include in your final report.

- 1 Outline the qualities you would look for in a planet that would make it a good candidate for further investigation in the search for life. Include the following in your report:
 - the type of planet
 - the location of the planet (habitable zone)
 - the composition of the planet’s atmosphere
 - the effect of life on the planet’s atmosphere
 - planets in the solar system that “fit” the description
- 2 Analyze the spectra—identify similarities and differences—and explain how this solar system data can be used for conducting a search for life on extrasolar planets. Your report should:
 - list the gases found in each planetary spectrum.
 - identify the gases common to all spectra.
 - compare similarities and differences of the two Earth spectra.
 - explain the connection between ozone (O_3) and oxygen (O_2) and why scientists look for ozone.
 - list the gases that are good biomarkers and those that are poor biomarkers. Defend your reasoning.
- 3 Based on your research, explain how planetary spectra might be used as a tool for exploring other worlds for life.

