

Molecules in the ISM: Are these clues to life in space?

You are going to work as a member of a team of astrochemists.

- Each team member has to take on one role (see the next page).
- You will analyse the data obtained from a radio telescope trained on the Milky Way.
- The team needs to answer the question, Molecules in the ISM: Are these clues to life in space?

The team must present their findings to the class.

- To make a good presentation, work together to answer the questions each team member has.
- Don't forget that you must answer the main question you have been set!
- Everyone in the team must agree the final presentation.
- The class will agree the criteria for assessing the presentations.



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<p>Researching background: element analysis</p> <p>Use a Periodic Table to find out the names of the elements that are found in space.</p> <p>To look for</p> <ul style="list-style-type: none"> ○ The three most common elements. ○ The element with the highest atomic number. ○ How many metals and non-metals are found. <p>Questions</p> <ol style="list-style-type: none"> 1. Which elements are needed to support life? 2. Are these present in space? 3. One group of elements does not appear in space. Find out which group and explain why. 4. What is the total number of molecules found in space? Does this surprise you? Explain! 5. Have any more molecules been found in space? Use the internet to see if you can find out. 	<p>Testing the data: molecular modelling</p> <p>Make some of the molecules in the Molecules in space table using the molecular modelling kit.</p> <p>Molecules to make</p> <ul style="list-style-type: none"> ○ HCl, CN, CO, CO₂, NH₃, C₂H₄ and CH₃CHO. These have bonds which we think of as covalent in conditions on Earth. ○ NaCl, KCl, NaCN, MgCN These have bonds we think of as ionic in conditions on Earth. They may have covalent bonds in space as conditions are very different. ○ Make any others from the Molecules in space. ○ Make drawings of some molecules. <p>Questions</p> <ol style="list-style-type: none"> 1. All available bonds are not always used. Why is this important for forming larger molecules? 2. Work out and explain the differences between an atom, a molecule, a radical and an ion. Give examples from the Molecules in space table.
<p>Collecting data: practical techniques</p> <p>Find out how the molecules in the Molecules in space table are detected. Describe this in your experimental procedures section.</p> <p>Questions</p> <ol style="list-style-type: none"> 1. How can such tiny molecules be detected from so far away? 2. How do we know that the signals are from a particular molecule? 3. What molecules would need to be detected to show there is life elsewhere? 	<p>Making conclusions</p> <p>Research how molecules form in space. Try typing How do molecules form in space? in a search engine. See if you can work out how and where molecules form.</p> <p>Questions</p> <ol style="list-style-type: none"> 1. Explain why there are more molecules with smaller numbers of atoms. 2. To make life, large molecules called polymers are needed. Molecules with double and triple bonds can form polymers. List these from the Molecules in space table. 3. Look at the largest molecules in the Molecules in space table. Could these make life? 4. What other experiments could be done to find out if there is life elsewhere in space?

