Clouds on other planets

Exploring how clouds form on planets in our solar system and beyond

Student worksheet

1 Activity 1 – Introduction to clouds on other planets

Exercise 1

What do you think it needed for clouds to form on a planet?

_____

_____

_____

2 Activity 2 – Cloud in a Jar Demonstration

Your teacher will demonstrate how to create a cloud in a jar. Think about what conditions are present in the jar and how you think this may be contributing to form the cloud.

The container acts as a mini-exoplanet atmosphere. In this demonstration, we must use water to make the cloud because we are doing the experiment on earth. If we were really on another planet, other chemical compositions could be used.

Exercise 2

Sketch the set up for the experiment. Make sure to include labels of the equipment.

❸ Activity 3 – Which variables effect cloud formation?

An important part of any scientific investigation is identifying the variables that are present in your experiment. In this activity, you will identify which variables are present in this demonstration.

Exercise 3

List the variables in this experiment. How does each variable relate to an exoplanet atmosphere?

Experiment Variable	Exoplanet Atmosphere Variable

4 Activity 4 – Experiment

In your groups you will investigate one of the variables in this experiment. First, come up with a hypothesis about how changing your variable will affect the cloud that is (or isn't) created in your jar. You will then work as a group to test this hypothesis and document your results.

Equipment

- One large glass container
- A Metal/ceramic plate/bowl that can be used as a lid for the glass container
- A kettle or water bath
- A container or beaker for hot water
- Thermometer
- Hairspray
- A water spray bottle (optional)
- Ice
- Washing up liquid soap (or other anti-fog substance for glass)
- A printed sheet of letters
- A digital camera

Health and safety

- Caution should be used when using hot water.
- Pouring cold water into a hot glass can cause it to smash.
- This activity involves the use of hairspray so it is important to keep the room well ventilated and to use very small quantities of hairspray at a time.

Exercise 4

Preparation

4.1 Which variable will your group be investigating?

_____

_____

4.2 How will you change your variable?

_____

_____

4.3 Which variables will you be keeping the same and how?

4.4 What is your hypothesis about how your chosen variable will effect this experiment?

Investigation

Use the space below to record the findings from your experiment.

Experiment Notes

Summary

In the space below summarise your findings and results from your experiment.
What did you learn about how clouds form?

Activity 5 – Present your findings to the class

Present what you have learned from your experiment to the class.
Listen to the presentations from other groups as their findings may help to reveal more about what is needed for clouds to form.

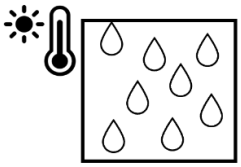
Exercise 5

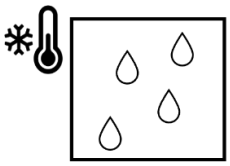
Sharing your findings with others is an important part of the scientific process. Use the space below to write a paragraph describing your findings to a student in another class.

Activity 6 – Background Science

Exercise 6.1

Fill in the blanks in the fact sheet below.

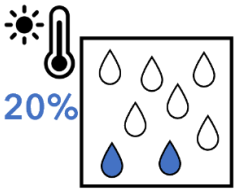


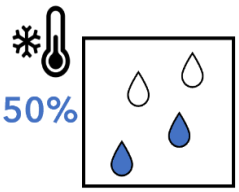


The maximum amount of moisture air can hold depends on its _____.
Hotter air can hold _____ moisture.

The **absolute humidity** of a pocket of air is

_____
_____
_____

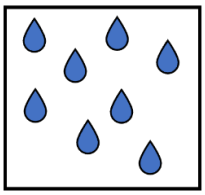




The **relative humidity** of a pocket of air is

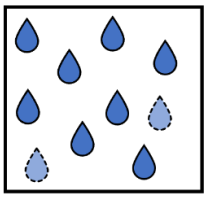
_____
_____
as a percentage of
_____
_____

100%

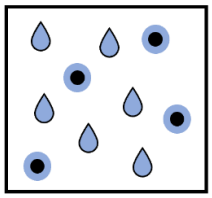


When a pocket of air is holding as much vapour as is possible at a given temperature it has reached_____
_____

125%



If the relative humidity is above 100% and there is no surface for the extra vapour to condense onto then the air will become _____
_____

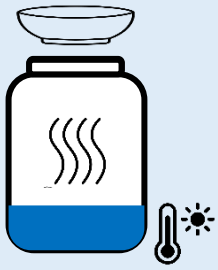
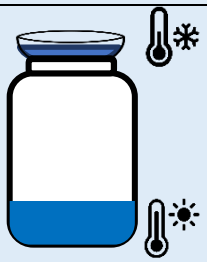
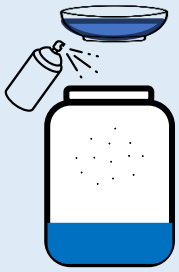
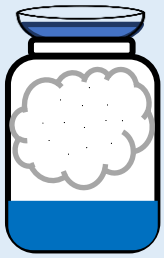


Aerosols in the air can act as a surface for vapour to condense onto to form clouds. These are known as _____
_____
_____

Exercise 6.2

Complete the table below.

In your written descriptions include the following words:
evaporate, humidity, saturation, condensation, aerosol and **cloud condensation nuclei**

	Experiment Diagrams	Atmosphere **(complete the diagrams)**	Scientific Processes **(add written descriptions)**
Step 1			
Step 2			
Step 3			
Step 4			

Exercise 6.3

Q1

Imagine you hear in the news that astronomers have found evidence of clouds on an exoplanet. From this information, what can you predict/deduce about the planet in question? Give as much detail as possible.

Q1 (extension question)

Some exoplanets are tidally locked to their star. This means that the same side of the planet is always facing the star, just like how the moon is tidally locked to the earth so that we only see one face of the moon. This results in one side of the planet being in constant daytime, and the other side of the planet in constant night. It is predicted that these planets will often have clouds only on one side, why do you think this might be?