



MISSION BRIEFING

Activity: Aerosol Sensor

Prep Time: 20 minutes 

Activity Length: 45-60 minutes 

Task: Participants will work in groups to make an aerosol sensor, a simple adhesive tool that allows them to collect data and estimate the extent of aerosols present in their surrounding outdoor and indoor environment.

By the end of this activity participants will:

gain an understanding of data collection and interpretation as they explore and observe the amount of aerosols present in the air around their school.

Materials

- (4) white paper plates for each research team
- Petroleum jelly or contact paper
- Duct tape
- (4) Wooden blocks/bricks
- Spoon or plastic knife to spread the petroleum jelly

Preparation

1. Gather and prepare all listed supplies.
2. Group participants into teams of two to three

Procedure

1. Divide participants into research teams of two to three.
 - Older participants should be able to conduct the activity individually or with a partner.
 - Younger members will need assistance in securing the aerosol sensors and ensuring proper, safe locations are selected.
2. Assign or have participants select four or more indoor and outdoor locations where they would like to place their aerosol sensors for testing.
3. Individually label the back of each aerosol sensor (plate) from A-D. List the aerosol sensor locations and specify, in the table on the next page, whether the test area is inside or outside.

Prior Knowledge:

Before beginning the lesson, ask participants the following questions and initiate a group discussion:

- What is an aerosol?
- What does it mean when we see haze outside?
- How do you and your family release aerosols into the atmosphere?

Consider reading [Exploring Colors in the Sky](#) with the participants to review topics like the atmosphere and aerosols.



Connection to NASA

NASA observes Earth and other planetary bodies via satellite-, aircraft-, and spacecraft-borne sensors that detect and record reflected or emitted energy. One of the ways NASA uses satellites orbiting Earth is to keep an eye on air pollution. TEMPO (Tropospheric Emissions: Monitoring of Pollution) will measure air pollution hourly across the North American continent during daytime.

[Click here to learn more about TEMPO](#)



MISSION GUIDANCE

GO

- Ensure participants have a background on [air pollution](#), [aerosols](#), and [remote sensing](#).
- Select a time period during which there is no rain or snow.
- Allow participants to draw the aerosols or particulate matter they observe.

MAYBE

- Show participants the [Surprisingly STEM video](#) about how NASA uses specialized technology to provide clean air to astronauts aboard the International Space Station.
- Allow participants to photograph the sensors before exposure to the test areas. This will allow participants to compare sensors before and after collection.

NO GO

- Do not allow participants to wander the premises.



Air Pollution



Aerosols



Remote Sensing



STEM Video

Aerosol Sensor	Location	Inside/Outside	Rank (cleanest to dirtiest)
A			
B			
C			
D			

- Create four sensors. Use the duct tape to securely attach a paper plate (sensor) to a brick or other weighted object to secure it.
 - Participants may have to anchor the sensor if conditions are windy. Make sure the paper plate is firmly taped to the device anchoring or holding it.
- After the paper plate is secured, use a spoon or plastic knife to coat the top of it with petroleum jelly.
- Expose the sensor to the outside or indoor air for at least 2 hours, but for best results leave the sensors in the testing areas for up to 24 hours or multiple days.
- After at least 2-24 hours, have research teams collect the sensors.
- Have participants observe the aerosols or particulate matter that adhered to the plate and compare the aerosols collected from each group. Optional: Provide participants with magnify glasses to see smaller particles.
- Task research teams to record, in the table, rankings for each location from cleanest (1) to dirtiest (4) and answer the following questions.

Challenge Questions

- Can you see any particles in the petroleum jelly?
- Did the indoor aerosol sensors have more or less particles than the outdoor ones?
- What types of weather conditions could cause the results to change? Why? (Conditions like wind, rain, snow, or extreme heat could cause a change in results. These conditions affect the amount of aerosols present in the air.)
- What are other methods might your team use to collect data on atmospheric particulates? (Observe deposits of aerosols on objects, e.g., cars, glass, furniture.)

Extension

- Experimental Design: After participants experience using their sensors to detect aerosols, they may design a contraption that reduces aerosols to improve air quality in their community. Designs can be planned out on paper, graphically, or built using household or craft supplies.
- Compare Samples Across Multiple Days: Have participants prepare additional aerosol sensors to take outside each day. Remind them to record weather conditions each day the sensor is exposed to the open air. The participants can then compare the average aerosol amounts based on weather conditions.

ISS FUN FACT!

With three to ten astronauts living in such a tight, enclosed space, air management on the station is critical! Life support systems on the ISS must not only supply oxygen and remove carbon dioxide from the cabin's atmosphere, but also prevent gases like ammonia and acetone, which people emit in small quantities, from accumulating. Living in space isn't easy!

