

Design and Build a Particulate Matter Collector

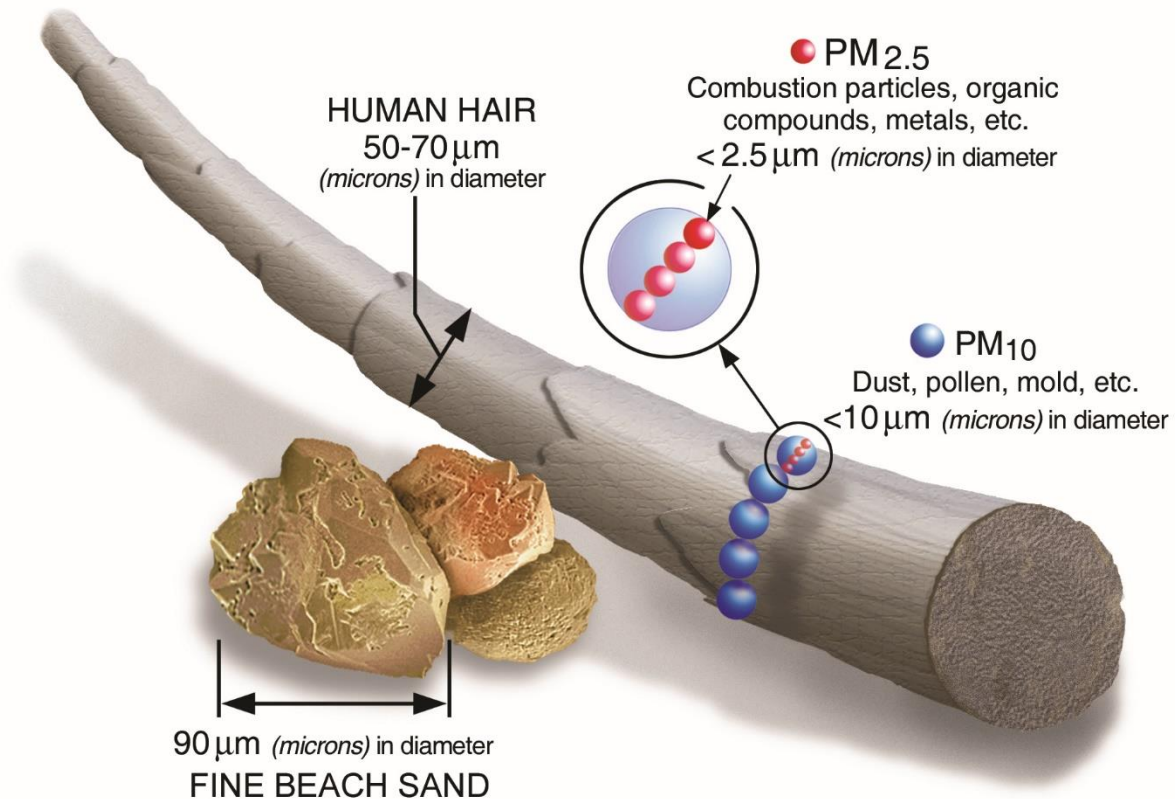
Student Response Sheet

Background

Particulate matter is a type of air pollution that can be created by natural processes and human activities. Particulate matter is harmful to human health because it can be inhaled deep into lungs, where it can cause damage to lung tissue.

The most harmful particulate matter is composed of extremely small particles, liquid droplets, or aerosols measuring less than 2.5 microns in diameter. This type of pollution is often called “PM_{2.5}” (pronounced “PM two point five”).

Because it is so small, particulate matter is invisible to the human eye. The illustration below compares the relative size of particulate matter to beach sand and human hair.



One micron = One millionth of a meter

Particulate Matter: Where does it come from?

Natural sources of particulate matter include:

- Volcanic eruptions
- Forest fires
- Dust storms

Human sources of particulate matter include:

- Burning fossil fuels
- Burning trash
- Cigarette smoking

Questions

1) Particulate matter is so small that it is invisible to the human eye. What are some other things that are too small to see with the human eye?

2) Describe some methods scientists can use to detect things that are too small to see.

3) What methods do you think could be used to collect and measure particulate matter?

Brainstorm!

Imagine you are an engineer and your job is to design particulate matter collector. What questions do you need to consider as you create your design? Ask your questions below.

- 1) _____
- 2) _____
- 3) _____
- 4) _____

Sketch Your Design

You will be using materials found around the house to assemble a model particulate matter collector. Your design can be a prototype model that represents something more complex, or you can design a model that actually collects particulate matter. On a separate piece of paper, sketch some ideas for your air pollution collector. Be sure to label the parts of your design and describe how those parts are supposed to function.

Gather Materials

The whole family can help with this! What household items could you use to build your pollution collector? Here are some suggestions to get you started:

- Various kinds of filter materials (coffee filters, knee-hi stockings, sponges, other items)
- Paper or plastic plates & cups
- Tape, glue, scissors
- Soda straws

List some other ideas for materials here:

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____

Assemble Your Collector

Now it's time to put it all together! Use the materials you gathered to create your model.

Present Your Design

Write a description of your completed model, answering the following questions:

- How does it work? Describe how air moves through or around the model and how it collects the particulate matter.
- How would you measure the particulate matter it collects?
- What challenges did you encounter as you tried to design and construct it?
- Video option: Get someone in your family to help you record a video of you showing the model and explaining how it works.

Explore!

How does a real particulate matter collector work? Find out how the Kentucky Division for Air Quality monitors particulate matter and other pollutants in the air we breathe by clicking on and exploring the story map ["How Clean is Our Air?"](#)

Play [Smog City](#) –Play the "Smog City" simulator to see how individual choices, environmental factors and land use contribute to air pollution.