

Hot Gas, Hot Air! (Part 1)

Time: Approximately one class session.

Standards:

Earth science - ninth grade 4.c

Topical Objectives:

Show how greenhouse gasses (CO₂ and water vapor) absorb and reflect heat.

Safety Rules:

Dry ice (for teachers)
Infrared lights are hot!

Materials:

- Containers with lids for gas collection (containers need to be large enough when laying on it's side to cover the ice containers)
- Infrared lights or sun
- Dry ice
- Small paper cup (3 oz)
- Large plastic cup (16 oz)
- Graduated cylinders (small as possible or small syringes with tip blocked)
- Stop watch
- Ring stands

Preparation:

Make ice blocks; Fill small containers half full of water (measured so all cups have the same amount) and freeze. In the large cup, punch a hole in the bottom. Put some dry ice in a screw top container - do not cap! After dry ice is gone, cap container (this way only CO₂ is in container).

Procedure:

1. Set up 2 ring stands.
2. Place the graduated cylinder under a ring.
3. Put the plastic cup above the graduated cylinder.
4. Remove the ice from the cup.
5. Set the ice block on the ring with a slant toward the hole (Make sure the spacer keeps the ice block from blocking the hole).
6. Align the cylinder under the hole.
7. Place container of CO₂ on top of one of the ice block containers and a container of "air" on the other.
8. Place each heat source above each gas container. Make sure the heat is equal distant from each container.
9. Turn on heat sources.

10. Record at 5 minute intervals the amount of water in the cylinder.
11. Graph your data.
12. Analyze your findings.

Extensions:

Use different gasses; water vapor, methane (from a bio-gas generator)
Use colored Ice (black)

Synthesis:

Feeding off a prior unit involving the generation of greenhouse gasses, show how those gasses affect the transfer of heat to a polar environment and how gasses regulate heat that melts the ice.

Sources: Sandy Hively