

Heat

Light mill

Home-made Crooke's radiometer

You will need....

- ✓ Aluminium foil
- ✓ Glue
- ✓ Fine thread
- ✓ Jar
- ✓ Candle
- ✓ Knife
- ✓ Card (10 × 10 cm)

Background:

A light mill or radiometer turns when placed in the light.

Follow these steps:

1. Cut out two pieces of aluminium foil 4 × 8 cm in size. Cut a 2 cm slit in the middle of the pieces and slot them together to form the blades of the radiometer.
2. Blacken one side of each vane using a lighted candle; holding a knife blade behind the foil may help. No two black surfaces should face one another.
3. Glue a very fine thread to the centre so that the vanes can turn horizontally.
4. Cut a slit in the centre of the card and insert the free end of the thread.

5. Suspend the vane in a tall jar and adjust the height so that the vanes are free to rotate.
6. Place the jar in the sunshine.

So what happened?

The vanes turn slowly . (They will not continue turning because the thread will twist and eventually produce an opposing torque.)

The dark sides become warmer than the shiny sides. Air molecules rebounding from these hotter sides cause a reaction which drives the vanes in the opposite direction.

In a commercial radiometer the vanes are on a pivot and so there is no opposing torque. The container is also partially evacuated and there is less air resistance. If it were completely evacuated the vanes would not rotate.

What next?

1. Investigate other designs for the radiometer (e.g. alternative suspension for the vanes).

