

Create a Heat Detector

In this experiment, you will learn how to create your very own heat detector.

If you are a big fan of spy gadgets and stories of mystery, you will sure find this project very interesting! You will be surprised that it is not that hard making your own heat detector that actually works!



The banner features the Explorable logo at the top center, with the text "EXPLORABLE" in a large, bold, sans-serif font and "Quiz Time!" in a smaller, cursive font below it. Below the logo are three square images, each with a caption underneath. The first image shows a pair of red roller skates on a wooden floor, with the caption "Quiz: Psychology 101 Part 2". The second image shows a fan of colorful pencils, with the caption "Quiz: Psychology 101 Part 2". The third image shows a Ferris wheel at sunset, with the caption "Quiz: Flags in Europe". In the bottom right corner of the banner, there is a link that says "See all quizzes =>".

Materials

In creating your own heath detector, you will need the following materials:

- Rubber band
- Wooden block (it is recommended to use a block that is large enough for the rubber band to stretch around the edge of it without snapping the rubber band)
- Thin nail
- Cardboard
- Scissors
- Heat source like matches, lighter or candle

Have you got all the materials needed yet? Great! Now you are ready to make your heat detector!

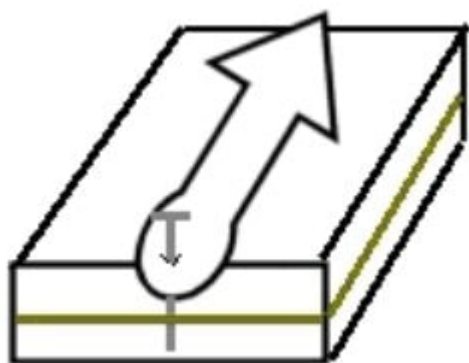
Procedures

By creating a heat detector, we will demonstrate the effect of heat to different kinds of

materials. The estimate time needed for this experiment is 15 minutes.

The first step in this activity is to create your heat gauge. Take the cardboard and cut it into an arrow shape. The length of the arrow should follow the length of your wooden block. Now, get the rubber band and fit it around the wooden block.

After this, take the thin nail and insert it through the central base of the arrow cardboard. Position the thin nail under the rubber band, at the centre of one side of the block. By then, your project should look like this:



Source: sciencefairadventure.com [1]

Now, you are finished! All you need to do is to try whether your heat detector actually works. You can do this by taking whatever heat source is available, be it a candle, match or a lighter. Light it and bring it near the rubber band close to the pin. Notice that your cardboard arrow will start moving in a counter clockwise direction.

Now, position the heat source on the opposite side. Observe in which direction the cardboard starts rotating.

Discussion

The Creating a Heat Detector experiment aims to illustrate the expansion and contraction of materials when heat is applied to them. In this case, the material we are trying to heat is the rubber band.

When heat is applied to matter, its particles start to move around in an increasing speed resulting to greater average particle separation. When matter changes volume due to this, thermal expansion will be observed - matter expands. The degree of expansion depends on the level of temperature applied to the matter. It can be calculated by dividing the degree of expansion of matter by the change in temperature applied to it.

Looking at our heat detector, as soon as we applied heat on the rubber, the rubber band started to contract causing the thin nail to rotate thus moving the arrow. After positioning the source of heat on the other side, the heated portion of the rubber band is changed, and the former side cools down. We noticed that the arrow started moving the opposite direction as well. What actually happens is that, the rubber band contract when heat is applied to it and then expands as soon as the same area cools down. This explains the movement of the arrow.

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