

SMART KIDS LAB Step by Step



SMART KIDS LAB

How clean is the air you breathe? Is swimming water the same as drinking water? How many microbes live in the soil beneath your feet? And what does it all mean? DISCOVER how healthy your neighbourhood is and what you can do to improve it. SMART KIDS LAB lets you examine the water, noise, air, earth and light around you with homemade measuring instruments. On the smarkidslab.nl website, you'll find out how to make the measuring instruments (meters) and how you can GET STARTED.



POLLUTE THE EARTH WHEN YOU FART?!

For this experiment, you'll be investigating the GREENHOUSE EFFECT. Your farts contain something called METHANE GAS (CH_4), which is a GREENHOUSE GAS! When methane is released into the air, it holds on to solar heat and warms up the earth. That's NOT GOOD for the planet. The ice caps are melting and the weather is getting more extreme! Of course, your farts don't produce that much methane by themselves. Even your whole class's farts combined are not that harmful. But combine the emissions from all the people, animals, and factories in the world, and we get an awful lot of GAS. Cows are the biggest offenders. They are ruminants, so there's a lot of methane gas in a dairy cow's farts. There's so much that a family could use it to cook for a YEAR.

HOW DOES IT WORK?

It all begins with the QUESTION: What do you want to measure? Do you already know? GREAT! Now you can GET GOING.



STEP 1.

You start by making the MEASURING INSTRUMENT. *For this you'll need: [Smart Kids Lab / making meters](#). There you'll find all the information you need to get started.



DIFFICULT METER! Ask an ADULT to help you.

STEP 2.

Now it's time to go do RESEARCH and experiment. Before you start, think about what you want to investigate and how to go about doing it. For now, maybe just start with yourself. Prepare everything in advance and start waiting for a FART. A person farts about 10 to 25 times a day, so you won't wait long.

TIP: Eat a lot of brown beans or broccoli and you'll be farting in no time! You can find more fart facts on the compare-o-meter.

*What you'll need: the [Smart Kids Lab / experiments](#) worksheet. This explains how to use your homemade meter to collect data.

STEP 3.

Collect the measurement DATA on the Smart Kids Lab worksheet. *What you'll need: the [Smart Kids Lab / experiments](#) worksheet. You can record your measurements here.

STEP 4.

Go grab the COMPARE-O-METER so you can compare your measurement data to that of others. You'll also find a lot of interesting information here. *For this you'll need: [Smart Kids Lab / compare-o-meter](#) worksheet.

STEP 5.

Take a picture of your measurement data and put it on the GREAT DATA MAP. You can find it at smarkidslab.nl.

*What you'll need: You can take a photo with a phone or digital camera. THE GREAT DATA MAP can be found at smarkidslab.nl (in the menu bar).



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Making
Sense



waag society



Rijksoverheid
Ministerie van Volksgezondheid,
Wetzijn en Sport

How much does my fart pollute the air?

SMART KIDS LAB compare-o-meter

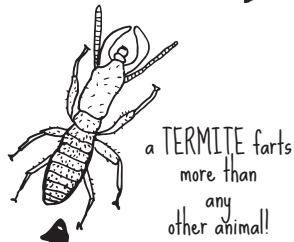


METHANE GAS
PER YEAR



Dairy cows

Cows are ruminants which means that their farts contain A LOT of methane gas! So much that an entire family could cook with it for a year.



Did you know:



ELEPHANTS are also pretty good at it!

YOU WOULD NOT EXPECT...



DOGS are also (secretly) experts in farting



even SHARKS can fart



and HERRING 'talk' to each other with their farts

But jellyfish can't fart ...



128 kg

73 kg

8 kg

5 kg

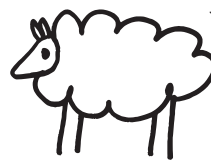
1.5 kg

?



beef cattle

PFFFFFT



sheep

PFFFFFT



goats

PFFFFFT



pigs

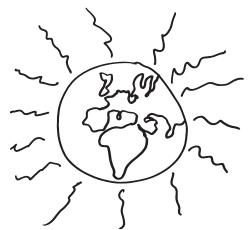
PFFFFFT



humans

PFFFFFT

you fart 14 times a day on average (mostly at night)



GREENHOUSE GAS:

farts contain methane gas (CH_4) which is a greenhouse gas! METHANE holds in solar heat and warms up the earth. That's no good for nature, polar bears, or the MELTING ICE CAPS!



How much does my fart pollute the air?

SMART KIDS LAB making meters

THERE ARE SEVERAL GASES FLOATING IN OUR ATMOSPHERE, including (a little) METHANE. Methane is a greenhouse gas and too much of it causes the Earth to warm up! Livestock on farms (especially cattle) produce a lot of methane gas. And, because humans eat a lot of beef and dairy products, we need a lot of cows. But that's NOT GREAT for nature. Cows are ruminants, which means they FART a lot, but how much methane gas do YOU expel? Let's find out! Create your own METHANE METER and measure your fart!

WHAT DO YOU NEED?

- MQ4 methane sensor (find online)
- 10 ohm resistor
- 2K ohm resistor
- Battery holder (4.5 v)
- VU meter
- Electrical wire (in different colors)
- Wire strippers
- Soldering iron
- Tape

1.



Cut one blue wire and two black wires and strip the ends. Also strip the ends of the wires on the battery holder.

2.



Place the MQ4 sensor down with the feet up and the sticker on the top. Solder the red wire from the battery holder to all the left feet.

3.



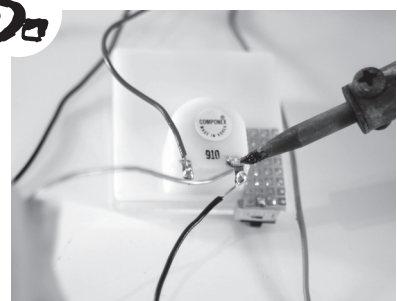
Solder the resistor to one of the black wires. Solder the other end of the resistor to the uppermost leg on the right side. Solder a new black wire to the middle leg on the right side.

4.



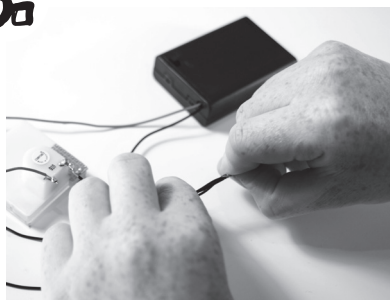
Solder the blue wire to the bottom leg on the right side. Solder the other end of the blue wire to the 2K ohm resistor and then to the "+" side of the VU meter.

5.



Solder a black wire to the "-" side of the VU meter.

6.



Now grab all three ends of the black wires and twist them together. Then solder all the black wires together.

7.

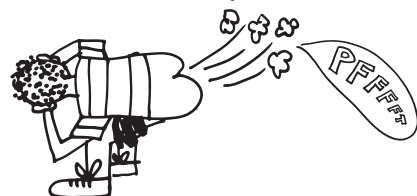


Place the batteries in the holder and gather everything together neatly. Gently stick the meter to the holder.

TIP

Eat a whole lot of BEANS, BROCCOLI, OR ONIONS and wait for a good fart. Make sure to hold your METHANE METER near your backside...

The more the pointer of your meter moves, the more methane is in your fart!



How much does my fart pollute the air?

SMART KIDS LAB experiments

Step 1 Improving air quality ... starts with yourself! Count how many times you fart in a day for three days ... don't forget to record when and where!

Step 2 Draw yourself farting! (you can include the reaction of those around you)

Put an X on the timeline below for each of your FARTS and record the spot where it happened!

Day 1
breakfast lunch dinner

Day 2

Day 3

Step 3 Make the FART METER and measure 3 farts to see how much they pollute!

☹️ = 10 milligrams methane
😐 = 30 milligrams methane
☺️ = 50 milligrams methane

Step 4 Draw what you've eaten here:

Step 5

Compare your pollution to that of other earthlings with the fart compare-o-meter! Why do you think you fart so much? Maybe something you ate?

MY RESEARCH CONCLUSION:

Step 6

Take a picture of this worksheet & put it on the BIG data map at SMARTKIDSLAB.NL

1 milligrams methane
2 milligrams methane
3 milligrams methane

now...
ADD THEM TOGETHER
AND THEN DIVIDE BY 3!
In my fart there is on average:

GAS

DIVIDED BY

1000

grams of methane per fart

×

number of farts per year

days in a year

×

365

=

grams

methane emissions per year

divided by 1000

=

farts per year

×

1000

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grams

methane emissions per year

divided by 1000

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