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C2.2 Cooling without electricity



Tracking down technology

You are familiar with a refrigerator from home. It works according to the same principle as the mini refrigerator that you built in the experiment. Of course, a lot more technology is involved in a refrigerator.

The technology ensures that the coolant used doesn't leak into the surroundings, but remains in the refrigerator where it continuously flows through the cooling circuit.



What it looks like in the refrigerator.

In the experiment, it got cold in the clay pot when the water evaporated. A refrigerator uses a specific coolant that absorbs a lot of energy when it evaporates and thus cools the surroundings.

1. Guess where this happens in the refrigerator.

2. Check your guesses. What places in the refrigerator feel particularly cold?

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Take a closer look at the back of the outside of the refrigerator. You will notice that it is rather warm there.

3. Guess where this heat comes from.



This is what the back of the refrigerator looks like.

4. Complete the following statement. Cross out the wrong terms.

The refrigerator heats / cools the interior and simultaneously heats / cools the exterior.

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The following text describes how the coolant circuit works.

5. Read the text and then in your own words, explain to your classmate next to you how a refrigerator works. Where does the heat in the refrigerator's interior go when the refrigerator cools down?

a.	The coolant evaporates in a cooling surface inside the refrigerator.
b.	It gets cold in the refrigerator.
c.	The coolant vapor is compressed by a pump (compressor) and liquefied again. In the process it becomes warm, like air with an air pump when you pump up a tire.
d.	The warm liquid coolant flows through the pipes on the back of the refrigerator.
e.	The coolant releases its heat to the surroundings in the black cooling coils on the back.
f.	The liquid coolant, now cooled, flows back into the refrigerator.
g.	The cycle starts over again.

6. A refrigerator needs electricity to work. Look for the place in the coolant circuit where electricity is needed and write down the letters: _____

7. Why is electricity needed?

8. Explain why it is important that the refrigerator door always be closed tightly.

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9. Why is it important that ice doesn't form on the cooling surface inside the refrigerator?

10. Start searching for all the places where the refrigerator principle is used in everyday life. Take notes.

This photo shows one example: An air-conditioning system is located on the roof of a commuter train. It also works according to the refrigerator principle.



Air-conditioning system on a train roof.
