

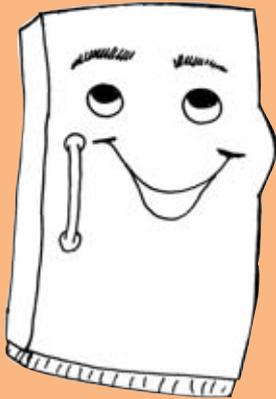


Green Schools Network

ACTIVITY SHEET

January 2011

Why talk about Refrigerators?



And still they are fresh. Thanks to the refrigerator the vegetables you bought at the market last week are still as crisp as they were on the day when you purchased them.

But what about the environment? Running throughout the day, a refrigerator is one of the major electrical energy consumers in a household. Do you know, it also contains gases which may be very harmful to the environment and to humans when they are released into the atmosphere? Let's try a few activities and find out how environmental friendly your refrigerator is and what you can do?

Name.....

School Name

Class..... Date

Activity 1: Let's take a closer look at your refrigerator

First of all try to lift up your refrigerator - carefully of course and under supervision of your parents. Is it very heavy? All the weight you can feel comes from components which have been specially produced, assembled and transported to construct your refrigerator. For this a lot of energy and a lot of different materials have been used.

Which materials have been used in your refrigerator? Examine your fridge and research online.

Material	Identified (yes/no)	Material	Identified (yes/no)
Fabric		Stone	
Wood		Aluminium	
Soft Plastic		Insulation foam	
Glass		Refrigerant gas	
Hard Plastic		Iron/Steel (test with magnet)	
Copper		Rubber	

Gobar Gyan: How does the refrigerator work?

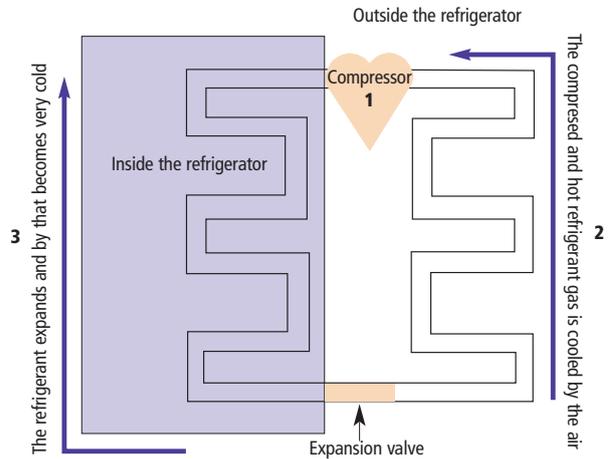
The compressor (1) is the heart of your refrigerator. In the same way as your heart pumps blood through your body the compressor pumps refrigerant gas through the coils of the refrigerator. For this it needs electrical energy. Listen carefully and you can hear the compressor 'hum'.



Hi! I am Pandit Gobar Ganesh. You will find me in Gobar Times—a magazine that tells you how your everyday life is linked to the world around you. Hooked, huh? If you want to know more about me and Gobartimes visit us at: www.gobartimes.org

The compressor compresses the gas and pumps it into the outside coils (2). The compression results in heating the refrigerant gas. In the coils outside the refrigerator the refrigerant is then cooled by the surrounding air. Try to touch the coils carefully. Are they warm? Note that in recent models the coils are hidden within the fridge's base.

The refrigerant then floats through the expansion valve into coils located within the inside back wall of the refrigerator (3). Here the pressure is very low, the refrigerant expands and consequently becomes very cold. Now it can cool the interior of your refrigerator. After this the gas is compressed again and the cycle continues.



Activity 2: Do you know how much energy your refrigerator consumes? Let's explore this and prepare an Energy Audit Report.

Technical Properties

The ratio between the average annual consumption and the total volume of your fridge shows how energy efficient your fridge is. The lower the ratio the more efficient is your fridge. The energy stars you might see on a sticker on your refrigerator are based on this calculation.

First of all check the users' manual to find out the average annual electricity consumption of your refrigerator. Note the average annual consumption in kWh per year here: _____ [kWh / year]

Note the total volume of your refrigerator in litres here: _____ [litres]

At the final step divide the annual consumption by the total volume. Write the ratio here: _____ [kWh/year/litre]. This ratio corresponds to _____ points.

Give: 20 Points for ratios > 1.0 15 Points for ratios > 0.9 10 Points for ratios > 0.8 5 Points for ratios > 0.75

Other factors

Your refrigerator's energy consumption also depends on the way you set up and maintain the fridge. You can work on optimizing it right now.

Give 5 Points for every "Yes" you can fill and reflect why it saves you energy.

Factor	Yes	No	Points
The refrigerator is in permanent shade throughout the day.			
The freezer and refrigerator are (almost) ice free.			
For fridges with visible outside coils: There is sufficient ventilation of the outside coils on the back of the refrigerator.			
For fridges with hidden outside coils (See the users manual, to find out where they are located): The coils are clean.			
The doors close properly.			

TOTAL SCORE:

- ✓ Congratulations if you have scored 35 or higher! You have an efficient refrigerator and you maintain and have set it up well!
- If you have scored 20 or higher you are in the midfield. Not bad, but there is still some work to do. Maybe you can change something right now.
- If you have scored below 20 you should try to improve your score significantly. Remember: A new refrigerator might be expensive. But due to lower energy consumption it saves you money also!

Keep two more things in mind when using the fridge. Do you have an idea why they are important?

Don't leave the door open longer than necessary.

Don't put hot food in the fridge. It should cool down before.

Gobar Gyan: What happens when the refrigerator is discarded?

Every refrigerator will be discarded some day. For its final journey there are two possible destinations. **First:** Back to the producer. This is the most sustainable option because your old refrigerator will be dismantled and its compounds properly recycled.

Activity 3: Your chance to be an investigative environment journalist

Do this exercise in a group and call the customer care hotlines of the companies your refrigerators are made by. Ask them about their recycling programmes. You could also try to get information from the appliance stores you bought your fridges from. **Copy the table below on an extra sheet and complete it for as many companies as you can. Which company acts most responsibly?**

Name of the company	Do they take old refrigerators back?	Do they charge anything?	Do they offer pick up from your home?	Which ratio of the material is being reused?	How do they dispose the refrigerator?

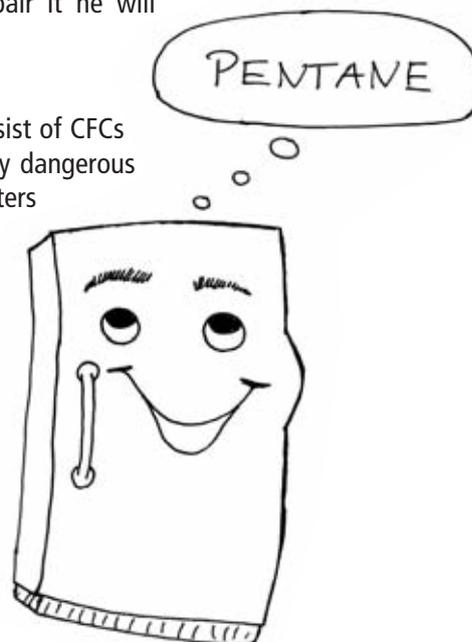
Second: A Kabadiwallha takes your old refrigerator. If he can not repair it he will dismantle it. And this may put environment into dire straits. Let's see how.

Gobar Gyan: CFCs and HCFCs

The refrigerant gas which circulates within the refrigerator's coils may consist of CFCs – Chlorofluorocarbons. If released into the atmosphere CFCs are extremely dangerous because they destroy Ozone. High up in the atmosphere Ozone normally filters the incoming sunlight like a sun screen or sunglasses and protects us from skin cancer and eye diseases. If the ozone is depleted harmful sunlight can reach the earth's surface and threatens our health.

In recent refrigerators CFCs may be replaced by so called Hydrochlorofluorocarbons (HCFCs). They do not deplete the ozone layer but still are far from being perfect because they contribute to global warming. There are HCFCs which are more than 10,000 times stronger greenhouse gases than CO₂.

But is there a perfect refrigerant gas? Yes there is! Pentane for example. It is neither ozone depleting nor a greenhouse gas and is used in many recent refrigerators and freezers.



Activity 4: Imagine you were to choose your family's new refrigerator.

You have learnt a lot about refrigerators and their effects on the environment now. What would you ask the salesperson in the showroom to find the most environmental friendly refrigerator? **Think of 10 questions and note them on the extra page where you have already copied and filled the chart of Activity 3. Keep this page and take it to the appliance store when you or your family buy a new refrigerator.**



Prepared by: Max Friedrich

If you found the activity sheet interesting, E-mail us at eeu@cseindia.org or write to:
Activity Sheet, Centre for Science and Environment, 41 Tughlakabad Institutional Area,
New Delhi-110062 or Call 29955124 Extension 219