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- be careful with appliances – most appliances are now CFC-free, BUT be careful about what appliances are thrown away or repaired. If refrigerators or air conditioners (in cars, for example) are to be repaired or thrown away, it is important to carefully remove the CFCs so that they are not released into the air and cannot harm the ozone layer.
- There are many simple ways of being well protected from the harmful rays of the sun. Follow the 3 rules of:
 - avoid the sun between 10am and 4pm;
 - cover your skin;
 - wear a hat.

Further reading

The New Gaia Atlas of Planet Management. 2005. N. Myers and J. Kent (eds). University of California: Berkeley.

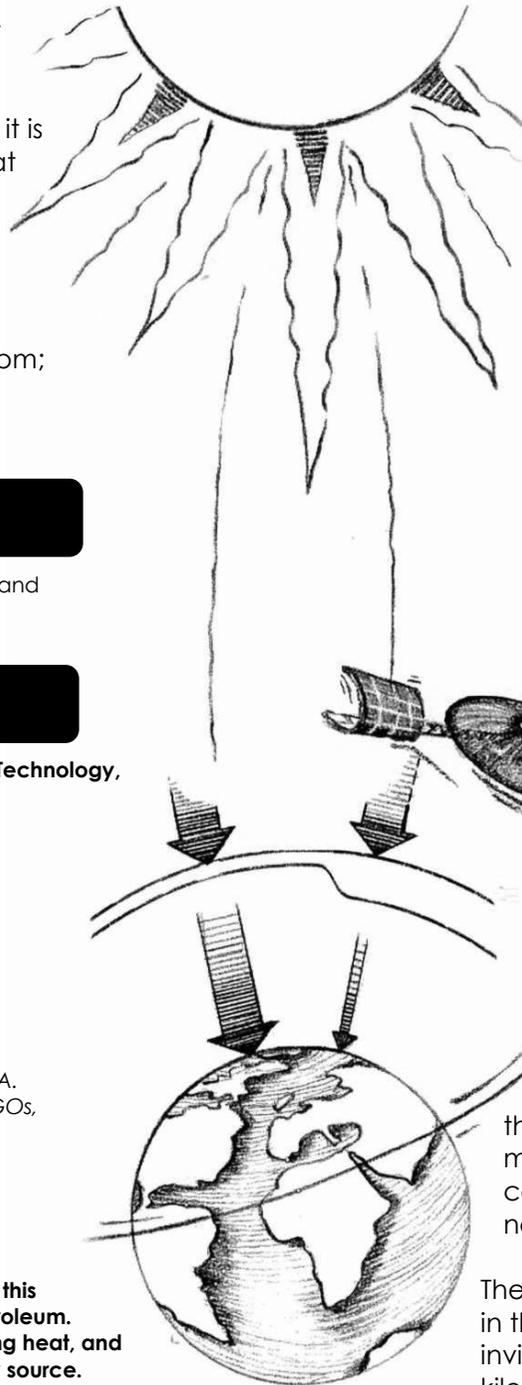
Useful addresses

United Nations Environment Programme (UNEP), Division of Technology, Industry and Economics, OzonAction branch. Website www.uneptie.org/ozonAction/



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In the quest for living and working more sustainably we have printed this enviro fact using non-toxic ink that is derived from soya, rather than petroleum. We use a wet ink process that requires no metallic toner or energy demanding heat, and solar energy, from current sunlight, rather than a fossil-fuel based, energy source. We hope you will enjoy reading this fact sheet and join us in seeking to live more sustainably.



Enviro Facts 10

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Ozone

The good effects of the sun

Without the sun's energy, no life would be possible on Earth. All living things need this energy to live. People too, get their life energy from the sun by eating plants and their products like fruits, vegetables, rice and potatoes. The sun is also good for people's growth and well-being. This is because, thanks to the sunlight, the skin can make Vitamin D which helps the body to use calcium needed for bones and muscles to be strong and healthy.

The ozone layer – a protection against the sun

The sun's energy is essential. But sunlight can also be harmful. This is because it has a component that cannot be seen but is dangerous to all living beings. This component is called "ultraviolet radiation" or UV rays.

Fortunately, the ozone layer protects the inhabitants of the Earth from UV rays. The ozone layer is like an invisible shield that wraps around the Earth, letting the sun's energy through and at the same time blocking its dangerous UV rays.

What is the ozone layer?

The ozone layer is a thin invisible shield that protects us from the harmful rays of the sun. This natural protective shield is made of ozone gas, which is itself made of very tiny elements called ozone molecules. The ozone molecules form a "safety net" that blocks most of the dangerous UV rays of the sun.

The ozone layer, formed by all these tiny molecules, is very high in the sky. It is part of the Earth's atmosphere, which is a large invisible layer extending from the ground to more than 80 kilometres above the Earth. The atmosphere contains several

gases including the oxygen needed to breathe and the ozone needed to protect us from UV rays.

Where do ozone molecules come from?

Ozone molecules belong to the oxygen family. Molecules are made of atoms, their smallest elements. The only difference between oxygen molecules and ozone molecules is the number of oxygen atoms they contain:

- Oxygen molecules have 2 atoms of oxygen.
- Ozone molecules have 3 atoms of oxygen.

In the upper atmosphere, ozone molecules are created through the breaking apart of oxygen molecules by the sun's energy. When an oxygen molecule is struck by the sun's rays, its two oxygen atoms separate and become single. If one of these single oxygen atoms joins another oxygen molecule, already made of 2 oxygen atoms, then it gives a group of 3 oxygen atoms - $1 + 2 = 3$, an ozone molecule.

Almost all oxygen molecules are found in the upper atmosphere but ozone molecules are fragile and their total amount is very small. Out of about 1 million air molecules, less than 10 are of ozone. This shows how small and precious the ozone layer is. These few molecules are vital - if the ozone layer is damaged, it can no longer protect us from the harmful UV rays of the sun.

The ozone layer IS damaged

Nature has always maintained a delicate balance so that ozone molecules, high in the sky, form an efficient protective shield against UV rays. But for many years, certain human activities have been seriously disturbing this balance, threatening and harming this natural protective ozone layer. These human activities are dangerous because they release into the air certain chemicals that destroy ozone molecules. This causes ozone layer depletion. The consequence is an increased amount of damaging UV rays reaching the surface of the Earth.

The chemicals that are responsible for ozone layer depletion are called Ozone Depleting Substances or ODS. There are different types of ODS but the most common ones are CFCs (chlorofluorocarbons), halons and methyl bromide.

The problem is that the releasing of such chemicals into the air today will still have negative consequences on the ozone layer in one hundred years from now!

The ozone hole

More than 20 years ago, scientists discovered the "ozone hole", an extremely alarming thinning of the ozone layer over the region of Antarctica (southern pole of the globe). Since then, they have proved that every year in spring the ozone layer is only half its size over Antarctica. Antarctica may seem far away but unfortunately, the ozone layer has also been severely damaged over other regions where people live - parts of South America, Australia, New Zealand and South Africa are particularly affected. Over North America, Europe and Asia the ozone layer is also getting thinner. The damage to the ozone layer is so bad that we can now say there are several "ozone holes". The consequences are serious - the more the ozone layer is depleted and the number of "ozone holes" increases, the more the people who live in these regions and countries are exposed to increased amounts of damaging UV rays.

Why is it important?

As the ozone layer is depleted by chemicals released into the air, it cannot protect as efficiently as it should. More UV rays can reach the Earth and threaten the well-being of the planet's inhabitants. To be well protected, it is also important that we understand what the bad effects of UV rays are - UV rays can harm our skin and eyes; and, they can also weaken our body's capacity to fight diseases (the immune system).

To protect all life on Earth from increased UV rays, it is crucial to protect the ozone layer and prevent it from being depleted by the chemicals people produce and consume. This means stopping the use of chemicals that deplete the ozone layer so that none are released into the atmosphere. Many countries in the world have already made some progress - more than twenty years ago, they agreed on reducing the level of several ozone depleting substances such as CFCs. They signed the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987. Thanks to these efforts, the first signs of recovery of the ozone layer are becoming noticeable.

What you can do

As individuals, we have an important role to play. The simple things we can do to protect the ozone layer, our natural shield, are:

- buy ozone-friendly products.