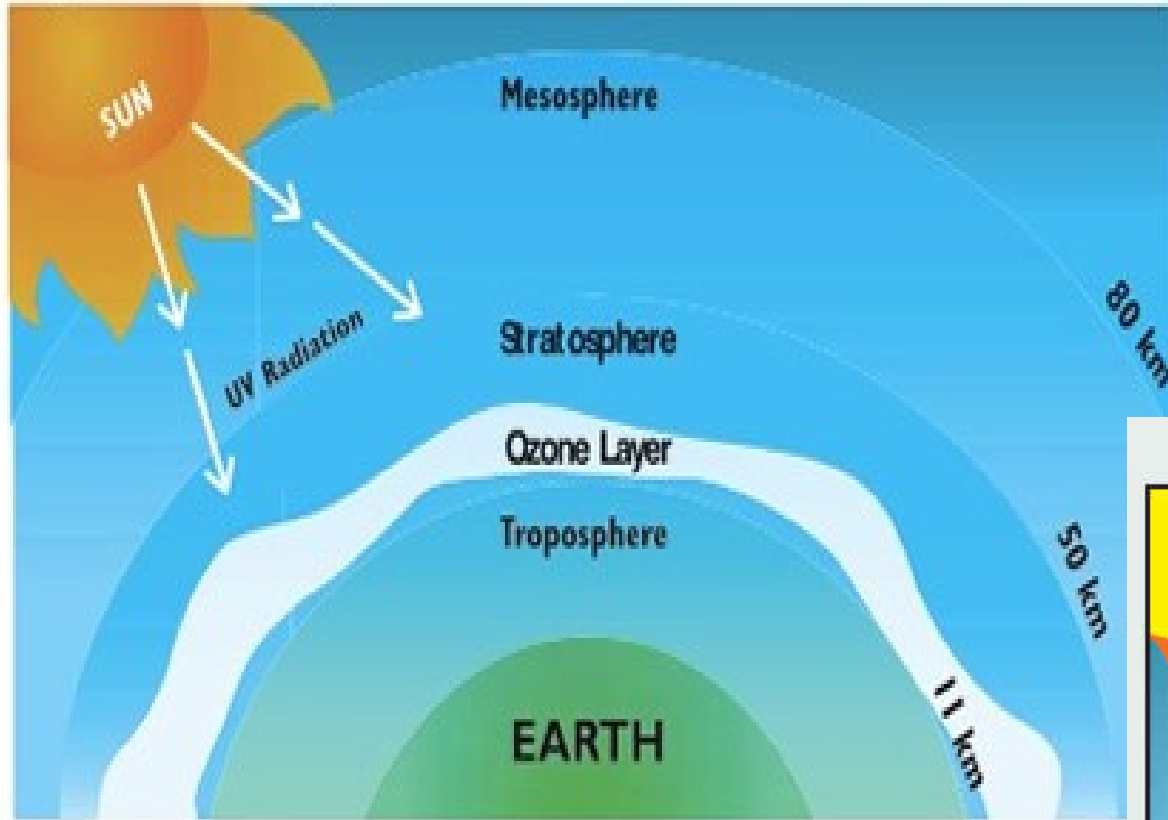


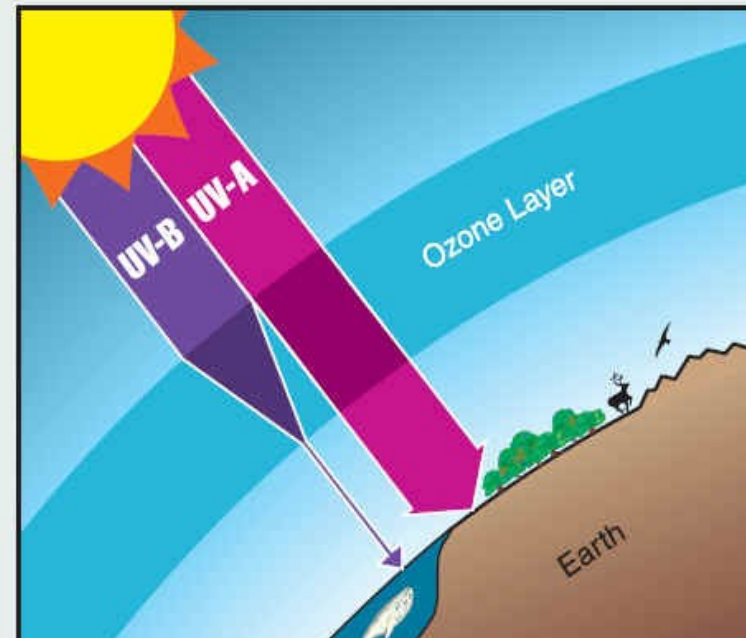
# Ozone Depletion

# Ozone layer in stratosphere

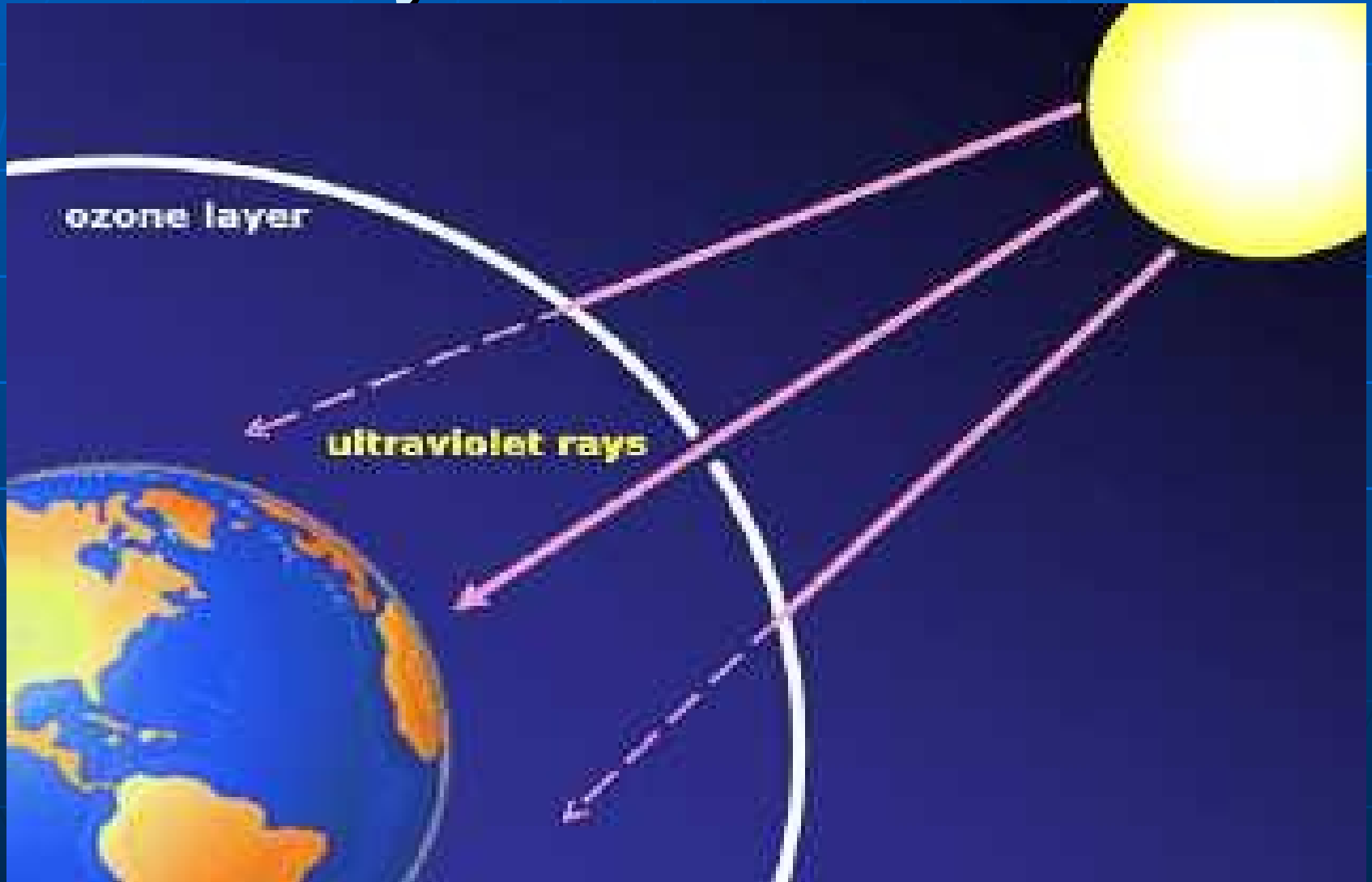
Layers of the Atmosphere



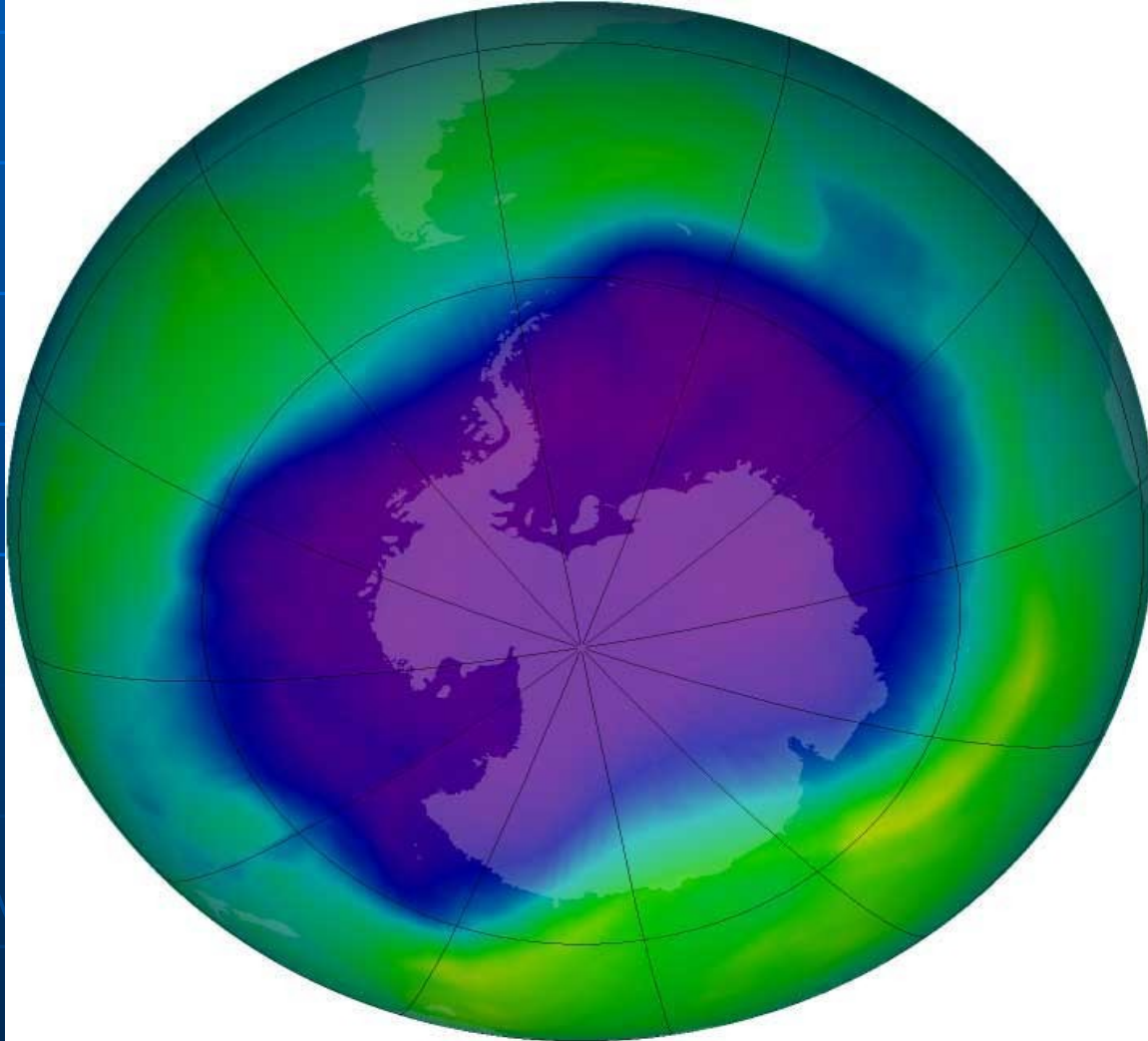
UV Protection by the Ozone Layer



# Screens out harmful ultraviolet rays from the sun



# A hole in the ozone over the poles



# Causes

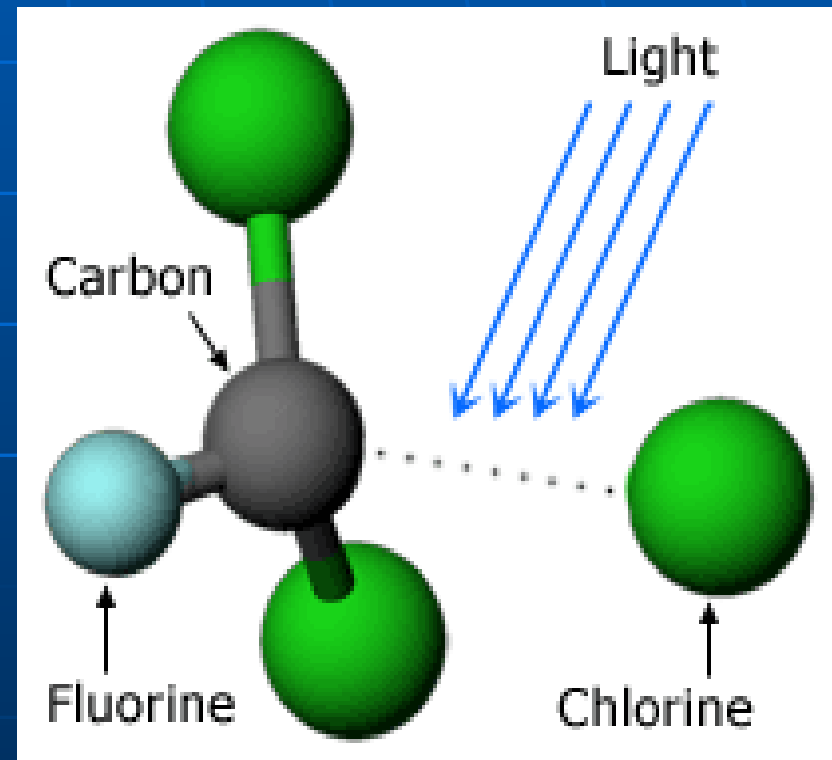
- Chlouroflourocarbons (CFCs)

Found in:

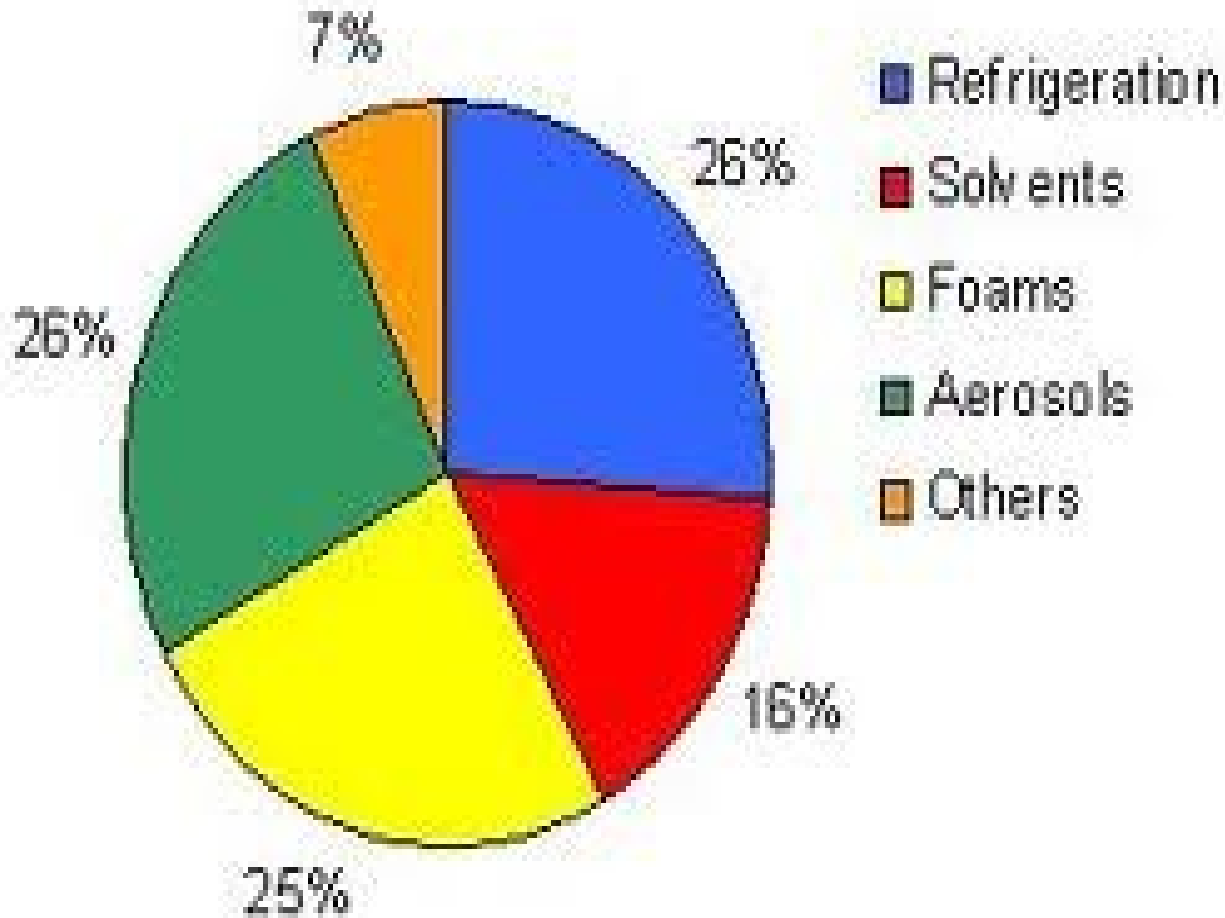
- Aerosol sprays
- Coolants (Fridges, Freezers, Air conditioners)
- Styrofoam production

# Chlorofluorocarbons (CFC's)

- an organic compound that contains only carbon, chlorine, and fluorine, produced as a volatile derivative of methane, ethane, and propane. They are also commonly known by the DuPont brand name Freon used in the cooling process.



# Sources of CFCs



# Aerosol Sprays

4

## Ozone Depletion

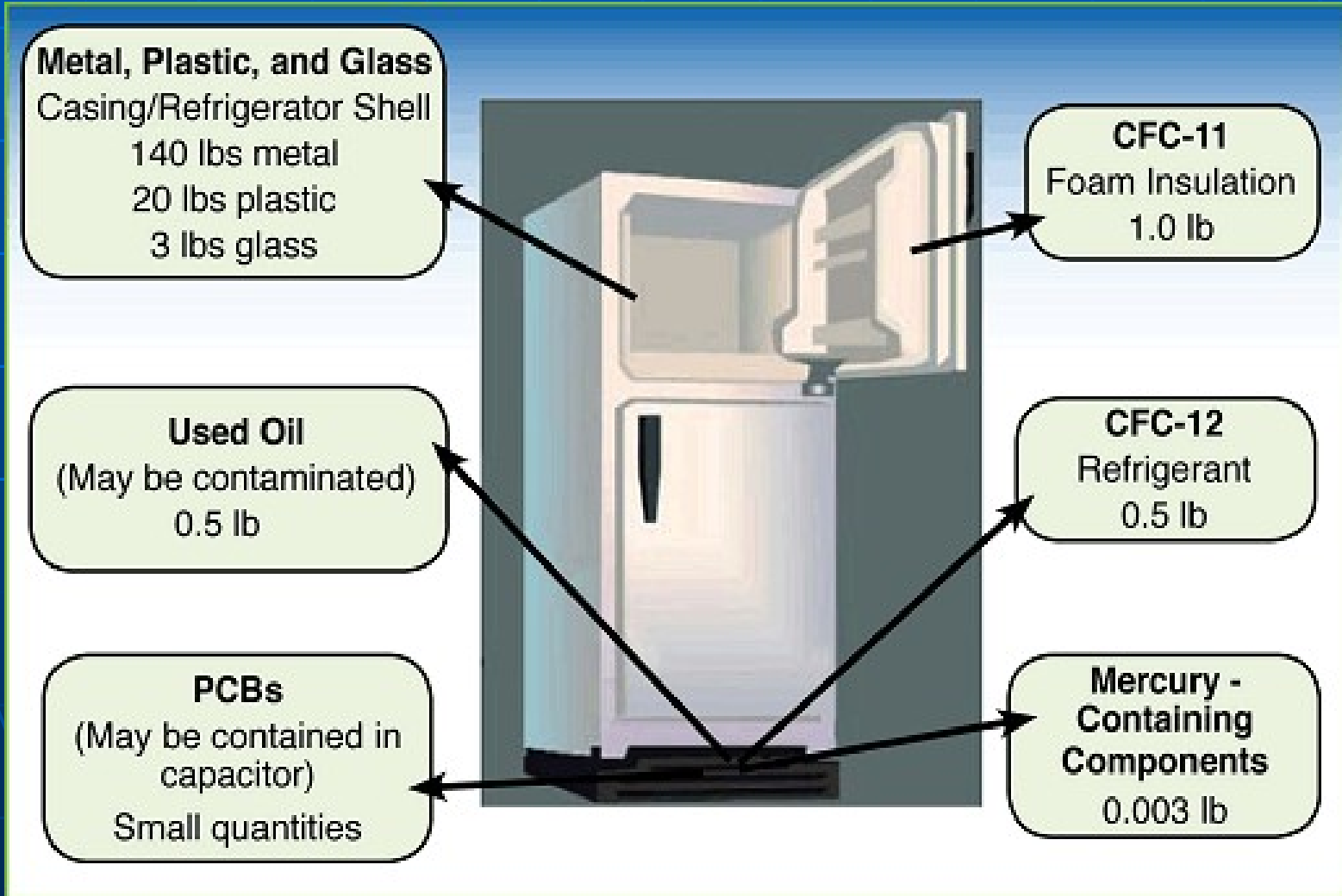


Major Culprits:

**Chlorofluorocarbons** (CFCs)



# Coolant in reffridgeration



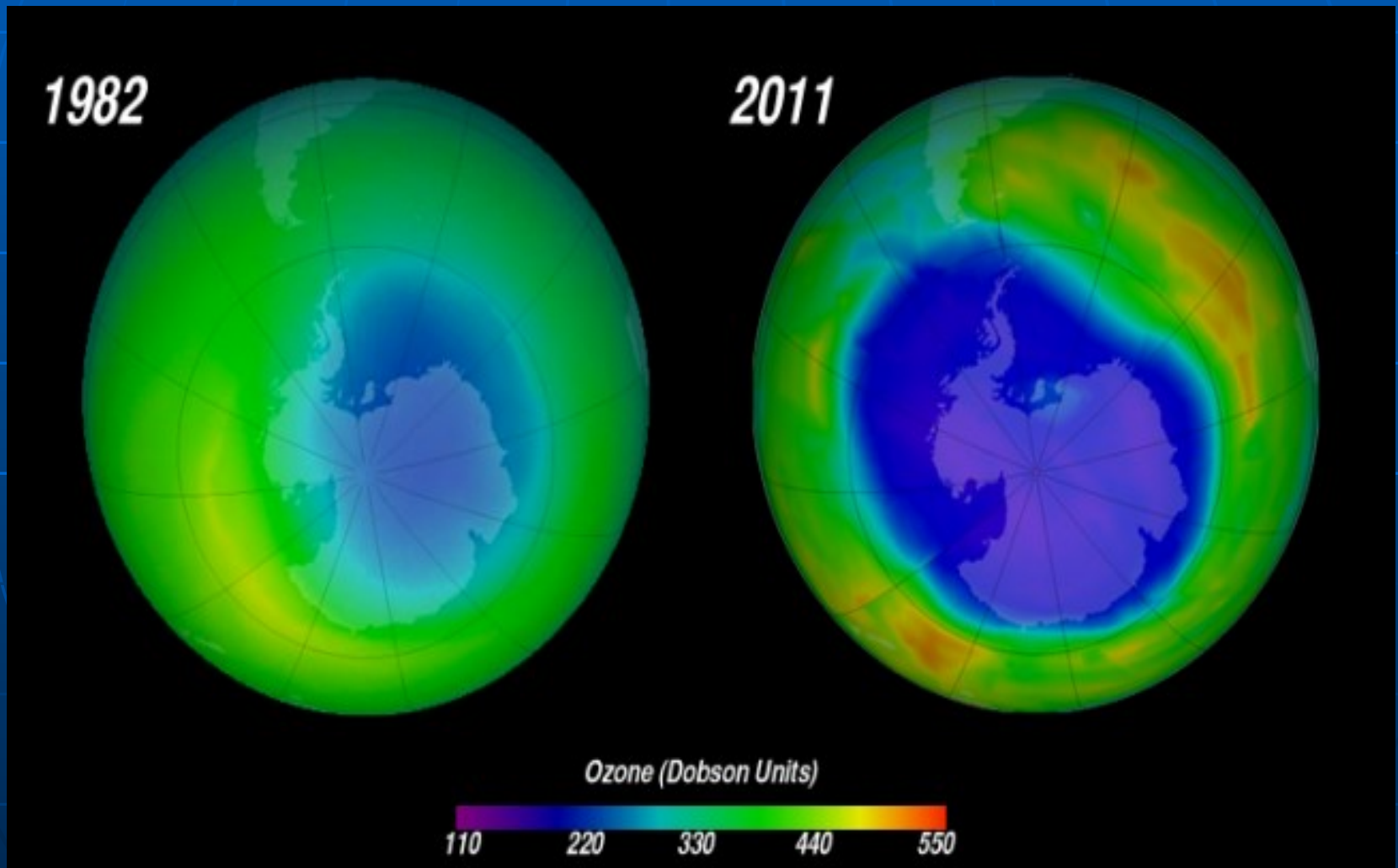
# Production of styrofoam



# Effects

- Hole in stratospheric ozone layer near the poles
- More UltraViolet Rays reach Earth
- Skin Cancer
- Cataracts and retinal damage to eyes
- Suppression of immune system
- Kills algae (effects food chains)
- Stunts plant growth (crops)

# Growing hole in the ozone layer over the poles



# Skin Cancer

When was your last self-check?

→ *Have you spotted any of these?*

Photos courtesy of Glamour



1



2



3



4



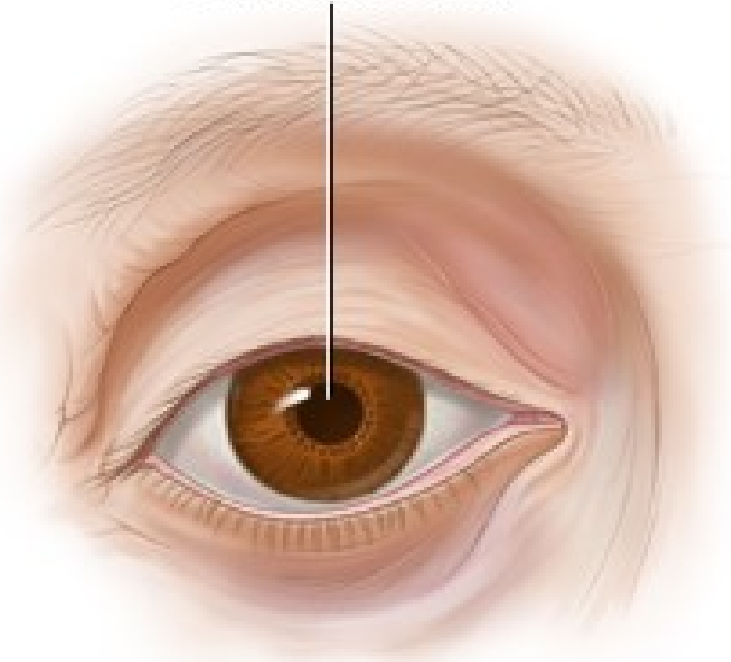
5



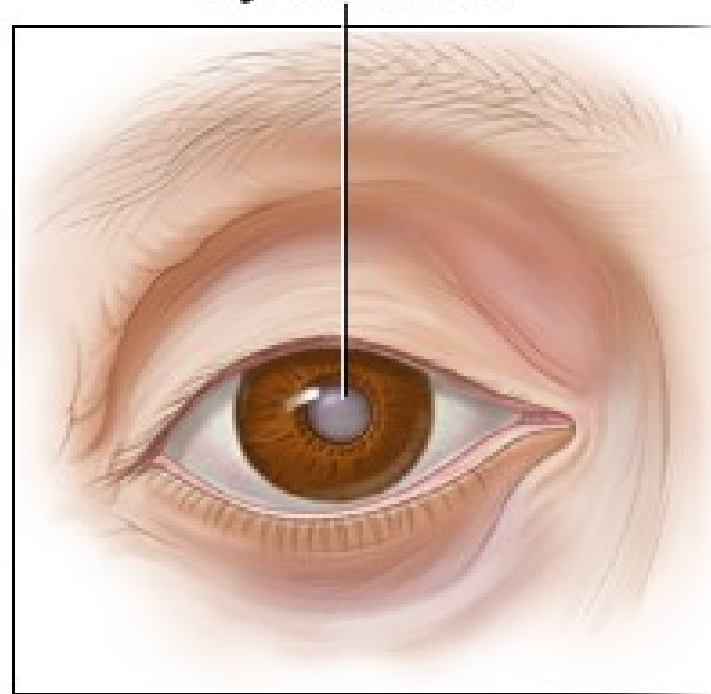
6

# Cataracts

Normal lens



Lens clouded by cataract



# More effects of ozone depletion

Human health



Plants & trees



Aquatic Ecosystems



Materials

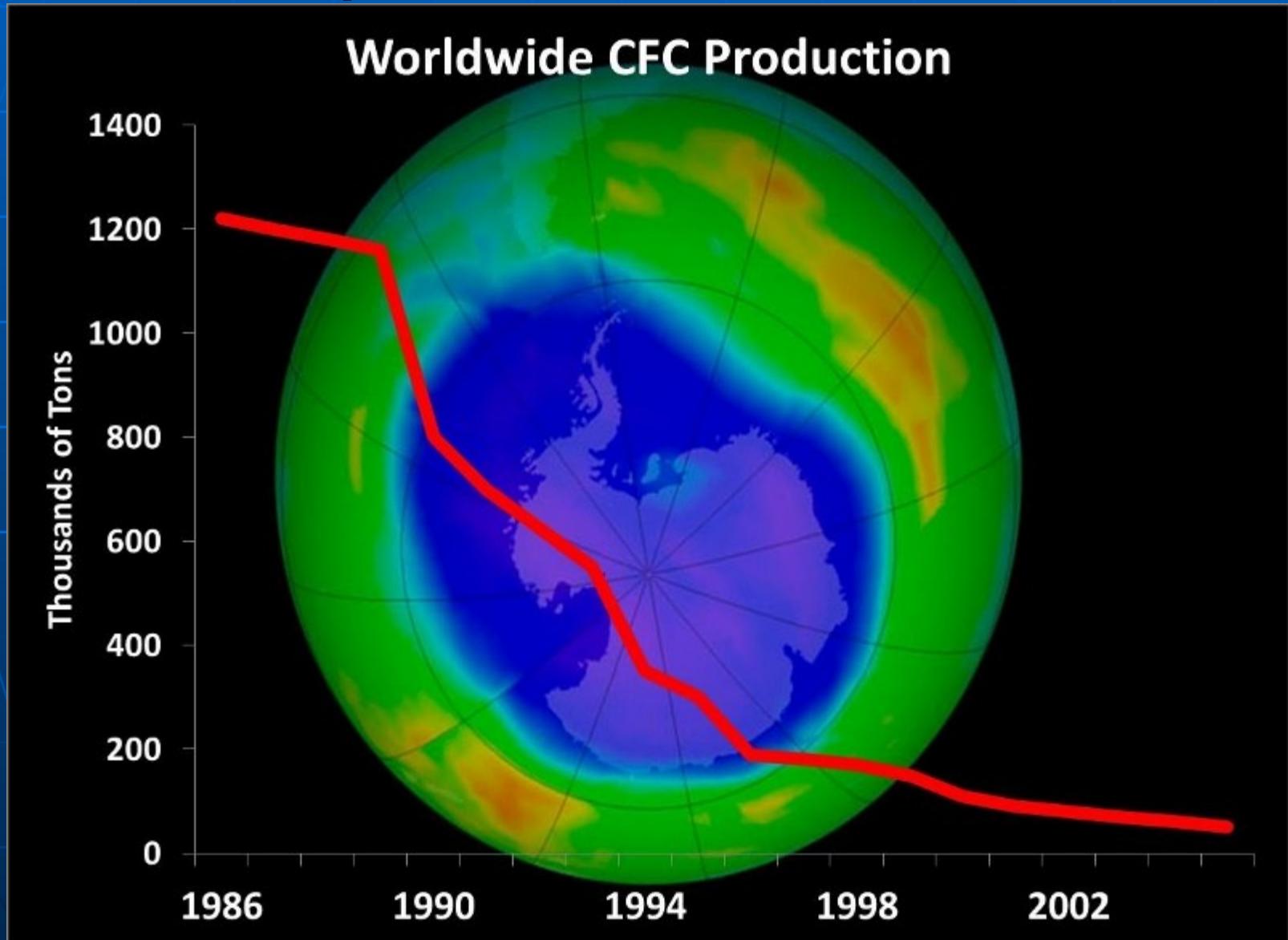


# Solutions

- Ban CFCs!
- Montreal Protocol 1987 initiated this
- International Cooperation
- Find alternatives (research)
- Use sunscreen
- Use UVA/UVB sunglasses
- Check UV Index



# Ban production of CFCs



# International Cooperation

The Montreal Protocol in 1987 was an international treaty to reduce and eventually ban products responsible for ozone depletion, principally CFC's



# Montreal Protocol



# Research Alternatives for CFC's

## Replacements of CFCs

CFCs	Replacements	Uses
CFC-12 ( $\text{CCl}_2\text{F}_2$ ), CFC-13 ( $\text{CClF}_3$ ), HCFC-22 ( $\text{CHClF}_2$ ), CFC-113 ( $\text{Cl}_2\text{FCCClF}_2$ ), CFC-114 ( $\text{CClF}_2\text{CClF}_2$ ), CFC-115 ( $\text{CF}_3\text{CClF}_2$ ) etc.	HFC-23 ( $\text{CHF}_3$ ), HFC-134a ( $\text{CF}_3\text{CFH}_2$ ), HFC-507 (a 1:1 azeotropic mixture of HFC 125 ( $\text{CF}_3\text{CHF}_2$ ) and HFC-143a ( $\text{CF}_3\text{CH}_3$ ) etc.	Refrigeration & air-conditioning.
CFC-114 ( $\text{CClF}_2\text{CClF}_2$ ) etc.	HFC-134a ( $\text{CF}_3\text{CFH}_2$ ), HFC-227ea ( $\text{CF}_3\text{CHF}_2\text{CF}_3$ ) etc.	Propellants in medicinal aerosols.
CFC-11 ( $\text{CCl}_3\text{F}$ ); CFC 113 ( $\text{Cl}_2\text{FCCClF}_2$ ); HCFC-141b ( $\text{CCl}_2\text{FCH}_3$ ) etc.	HFC-245fa ( $\text{CF}_3\text{CH}_2\text{CHF}_2$ ); HFC-365 mfc ( $\text{CF}_3\text{CH}_2\text{CF}_2\text{CH}_3$ ) etc.	Blowing agents for foams.

# Use Sunscreen



# Use UV protective sunglasses



# Check the UV Index

SUMMERSKIN  SUN PROTECTION MEETS STYLE

UV INDEX 1 2	UV INDEX 3 4 5	UV INDEX 6 7	UV INDEX 8 9 10	UV INDEX 11+
<b>Low</b> (0-2)	<b>Medium</b> (3-5)	<b>High</b> (6-7)	<b>Very High</b> (8-10)	<b>Extremely High</b> (11+)
Sunscreen, SPF 30+ Sunglasses	Sunscreen, SPF 30+ Sunglasses Hat & SummerSkin™	Sunscreen, SPF 30+ Sunglasses Hat & SummerSkin™ Seek Shade	Sunscreen, SPF 30+ Sunglasses Hat & SummerSkin™ Seek Shade  Limit time outside between 10am-4pm	Sunscreen, SPF 30+ Sunglasses Hat & SummerSkin™ Seek Shade  Stay inside between 10am- 4pm

[www.YourSummerSkin.com](http://www.YourSummerSkin.com)