

# WHAT IS OZONE?

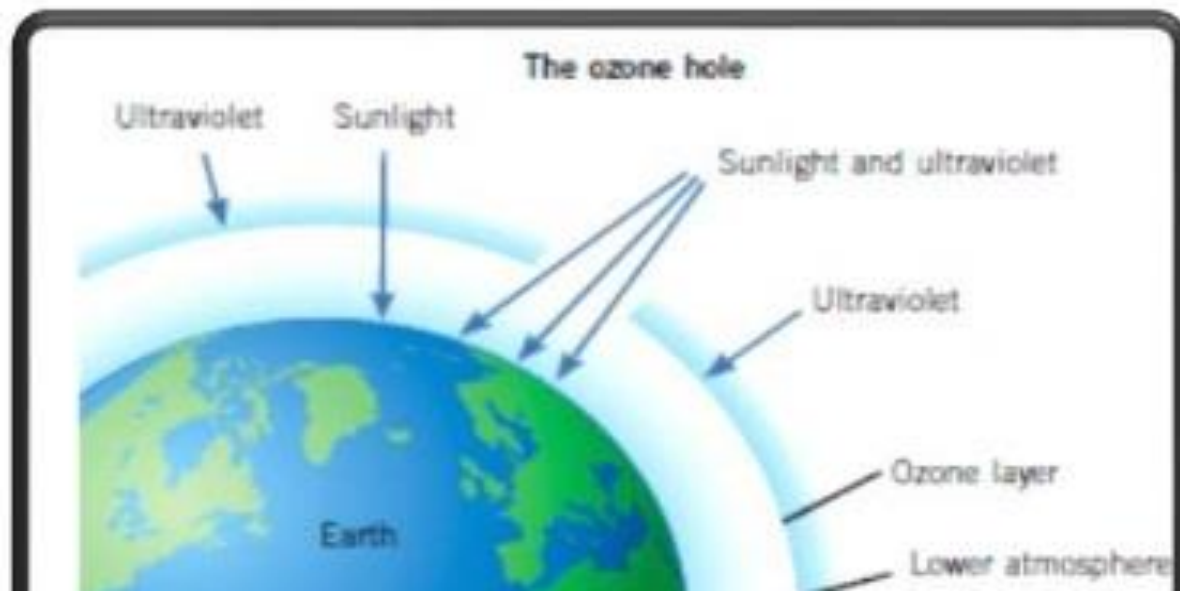
O<sub>3</sub>

A gas composed of three atoms of oxygen

Bluish gas that is harmful to breathe

Nearly 90% of earth's ozone is in the **stratosphere** and referred to as the **ozone layer**.

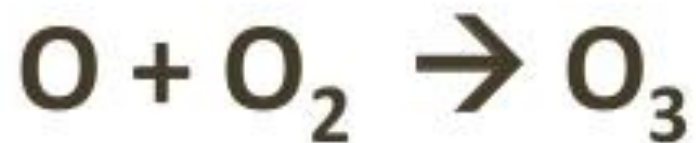
Ozone absorbs a band of ultraviolet radiation called **UVB**.





There are  
5 layers  
of the  
atmosphere

# FORMATION OF OZONE LAYER



Ozone (O<sub>3</sub>)

Chemically forms when UV hits on stratosphere  
Oxygen molecules dissociate into atomic oxygen



Atomic oxygen quickly combines with other oxygen  
molecules to form ozone

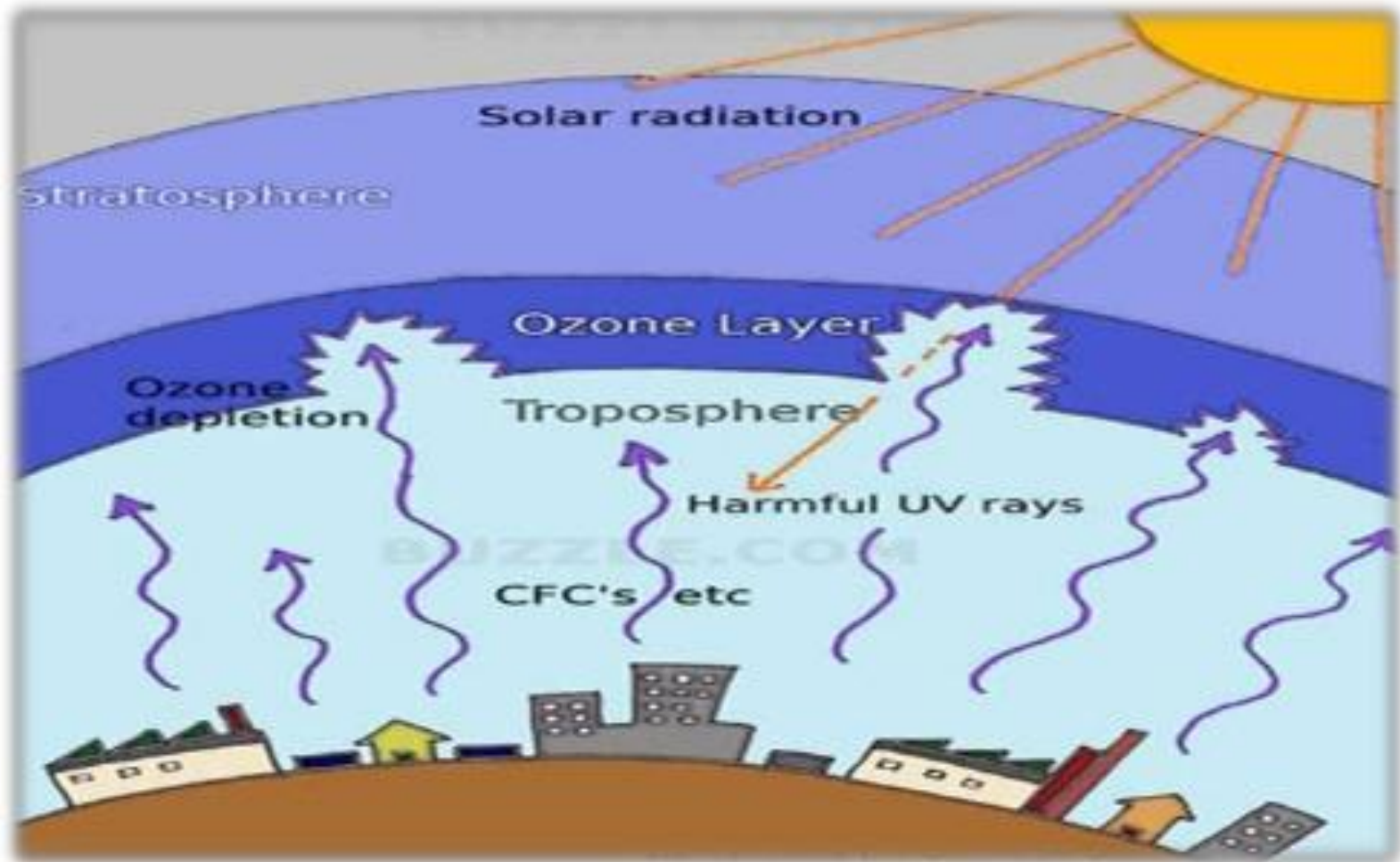


# OZONE DEPLETION

Ozone layer depletion, is simply the wearing out (reduction) of the amount of ozone in the stratosphere. Unlike pollution, which has many types and causes, Ozone depletion has been narrowed down to one major human activity.

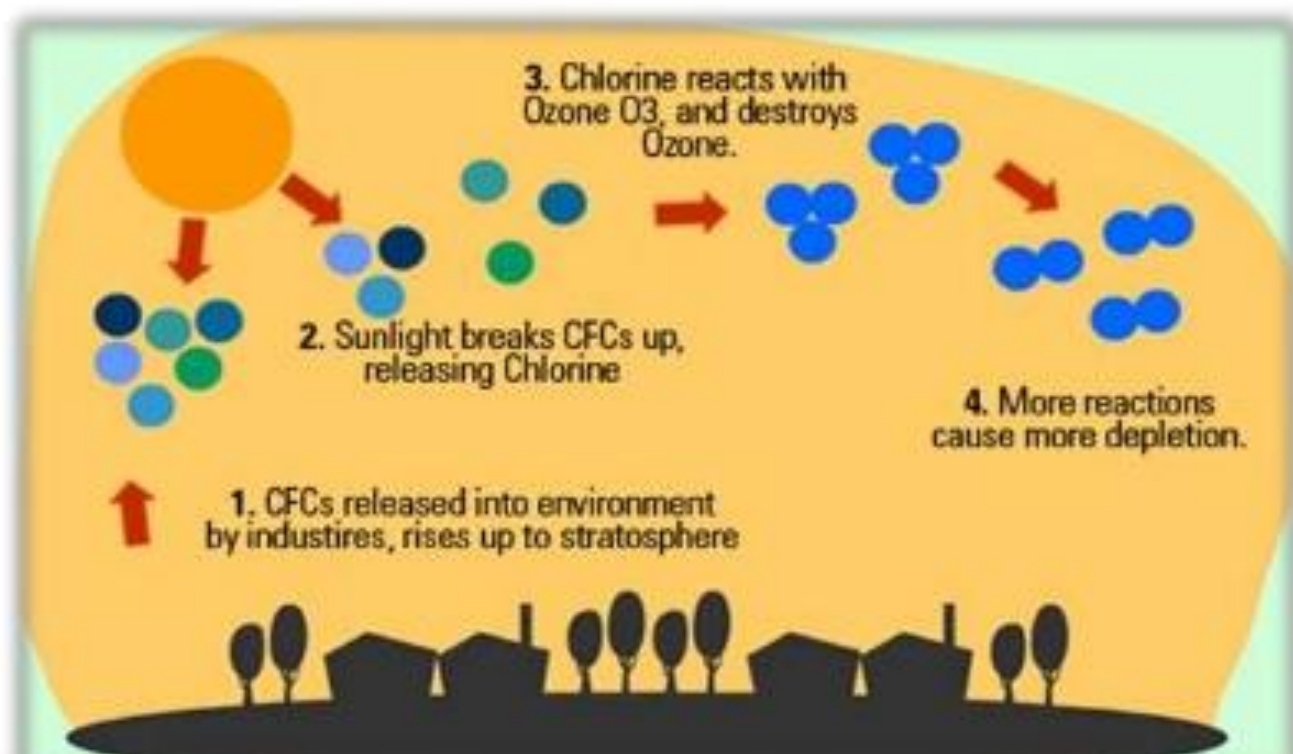
Industries that manufacture things like insulating foams, solvents, soaps, cooling things like Air Conditioners, refrigerators and 'Take-Away' containers use something called chlorofluorocarbons (CFCs).

Depletion begins when CFC's get into the stratosphere. Ultra violet radiation from the sun breaks up these CFCs.



The breaking up action releases Chlorine atoms. Chlorine atoms react with Ozone, starting a chemical cycle that destroys the good ozone in that area.

One chlorine atom can break apart more than 100,000 ozone molecules.



# CAUSES OF OZONE DEPLETION

- Man-made Causes
  - 1) Chlorofluorocarbons (CFCs)
  - 2) Halons
  - 3) Methyl Chloroform
  - 4) Hydrofluorocarbons (HCFCs)
- Natural Causes





# IMPACTS OF OZONE DEPLETION

## 1) HARM TO HUMAN HEALTH:

- (a) More skin cancers, sunburns and premature aging of the skin.
- (b) More cataracts, blindness and other eye diseases.

## 2) ADVERSE IMPACTS ON AGRICULTURE:

- (a) Plant growth, especially in seedlings, is harmed by more intense UV radiation.
- (b) Major crop species are particularly vulnerable to increased UV, resulting in reduced growth,

## EFFECTS ON PLANTS:

Physiological and developmental processes of plants are affected by UVB radiation, even by the amount of UVB in present-day sunlight.



Ozone injury to yellow-popular



Ozone injury to milkweed

1999

## **EFFECT ON ANIMALS:**

- (a) In domestic animals, UV overexposure may cause eye and skin cancers.
- (b) Species of marine animals in their developmental stage (e.g. young fish, shrimp larvae and crab larvae) have been threatened in recent years by the increased UV radiation under the Antarctic ozone hole.

## **EFFECT ON MATERIALS:**

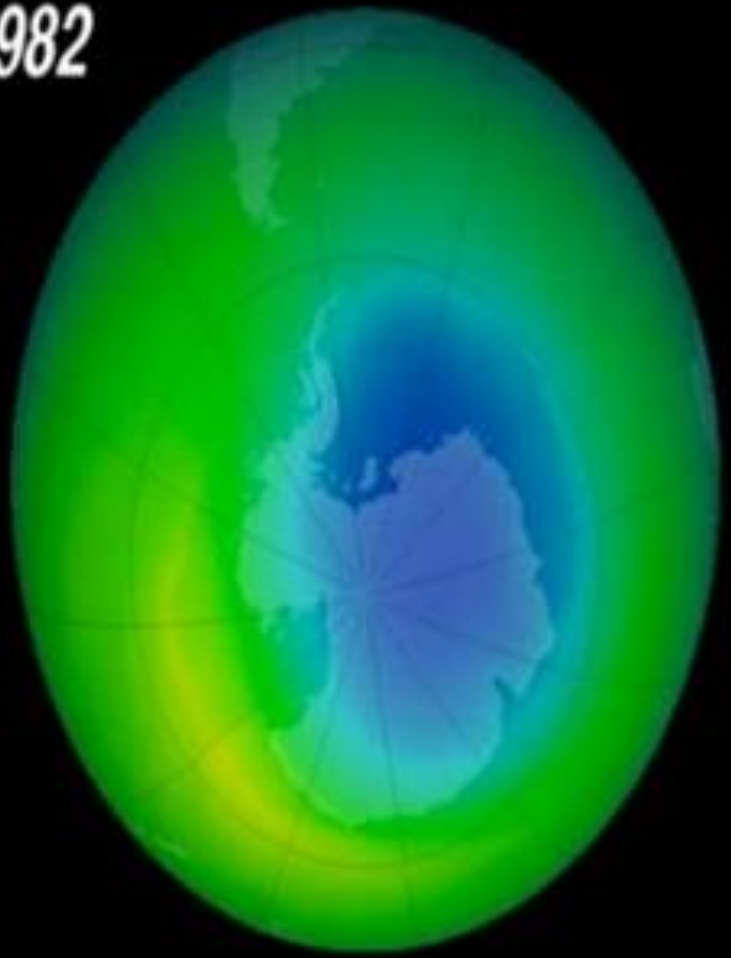
- (a) Wood, plastic, rubber, fabrics and many construction materials are degraded by UV radiation. The economic impact of replacing and/or protecting materials could be significant.

# IMPORTANCE OF OZONE LAYER

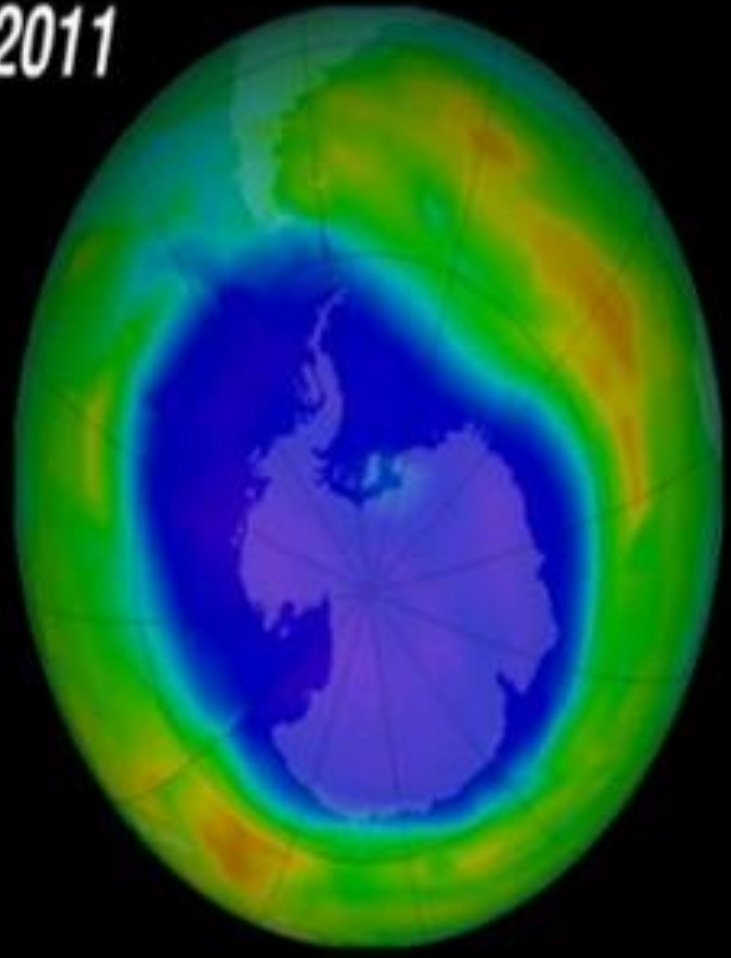
Ozone is concentrated in the lower stratosphere between 15 and 30 km above the earth's surface – the so-called 'ozone layer'. Ozone can be produced by numerous chemical reactions, but the main mechanism in the atmosphere for its production and removal is absorption of ultra-violet (UV) radiation energy from the sun.

The maintenance of enough stratospheric ozone to absorb harmful UV sunlight is therefore vitally important to all life forms on earth.

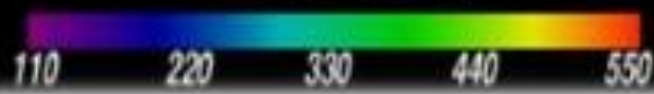
1982



2011



Ozone (Dobson Units)



# MEASURES TO PREVENT THE OZONE DEPLETION

- Limit private vehicle driving
- Use eco-friendly household cleaning products
- Avoid using pesticides
- Developing stringent regulations for rocket launches
- Banning the use of dangerous nitrous oxide

# INTERNATIONAL MEASURES

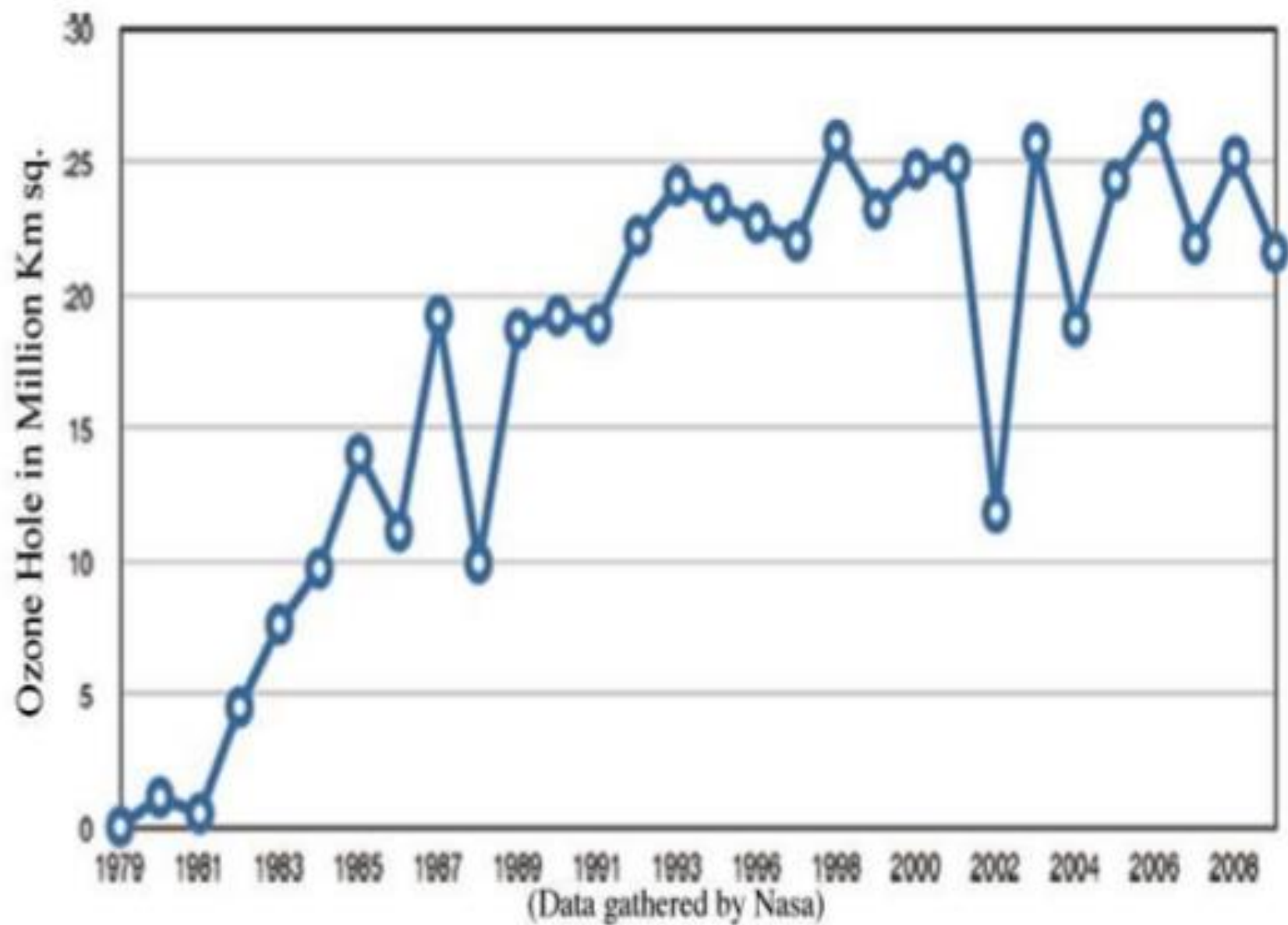
Montreal protocol signed in 1987.  
Comprise of 189 countries now.  
To reduce CFC substances.



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# NATIONAL LEVEL MEASURES

Singapore banned use of CFC products in 1991D.  
Countries can control the import and manufacture of CFC product.





# CONCLUSION

There is no doubt that the problem of ozone depletion exists and deserves extensive research and attention. With the release of each and every CFC, our ozone layer takes one small step towards its destruction. The decision to ban completely CFCs sooner than later cannot be decided by the United States or even the United Nations. The entire world must unite in order to expel this problem forever.

