



**Welcome to
chemistry**

Science

a search for facts about the world around us

understanding the past , predicting the future

Aristotle (384-322 B.C.)

one can work out all the laws that govern the universe by pure thought

Roger Bacon (1300's)

science should base its reasoning on experimental evidence.

science replaces philosophy

science

A procedure for processing and understanding certain types of information

If there is no test for its possible “wrongness”, then it is not scientific.

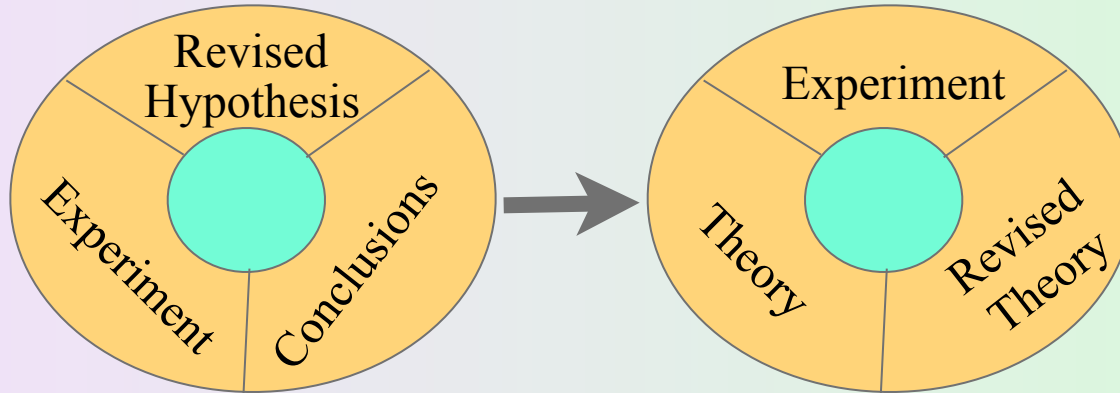
The Scientific Method

Observations

- Existing knowledge
- Qualitative data
- Quantitative data

Theory

- Hypothesis supported by many experiments



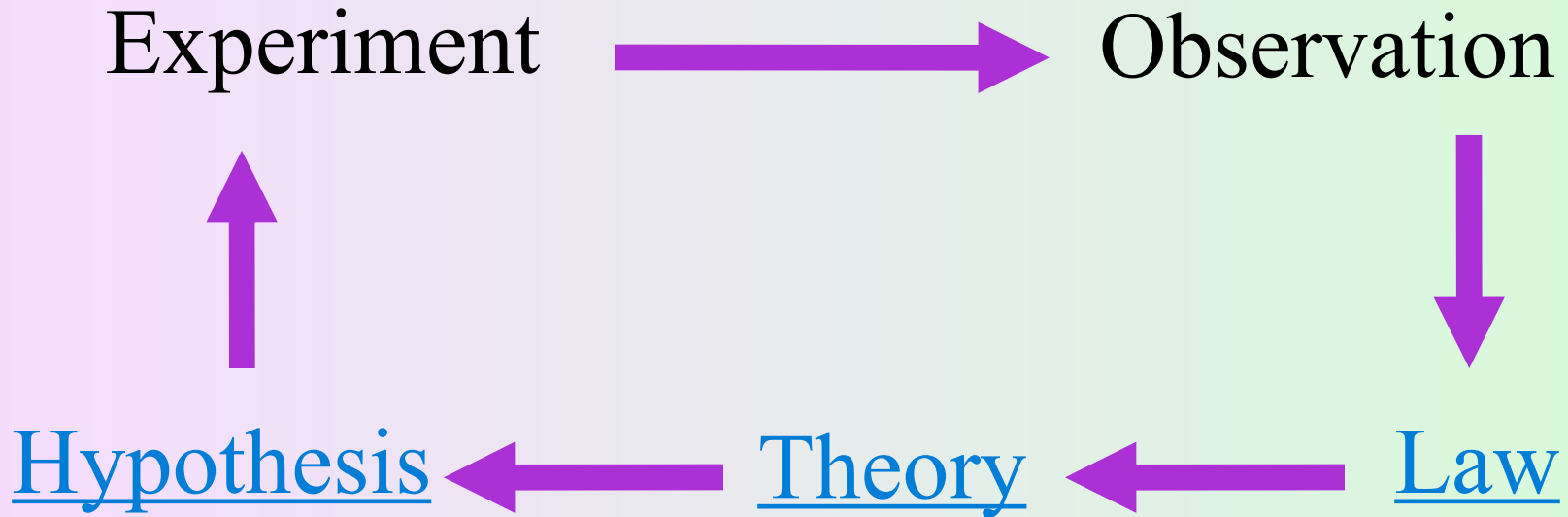
Hypothesis

- Testable statement or prediction

Scientific Law

- summary of accepted facts of nature

The Scientific Method



click on any underlined word for its definition

Science and Technology

**science is a method of answering
theoretical questions**

**technology is a method of solving
practical problems.**

A tale of two chemicals

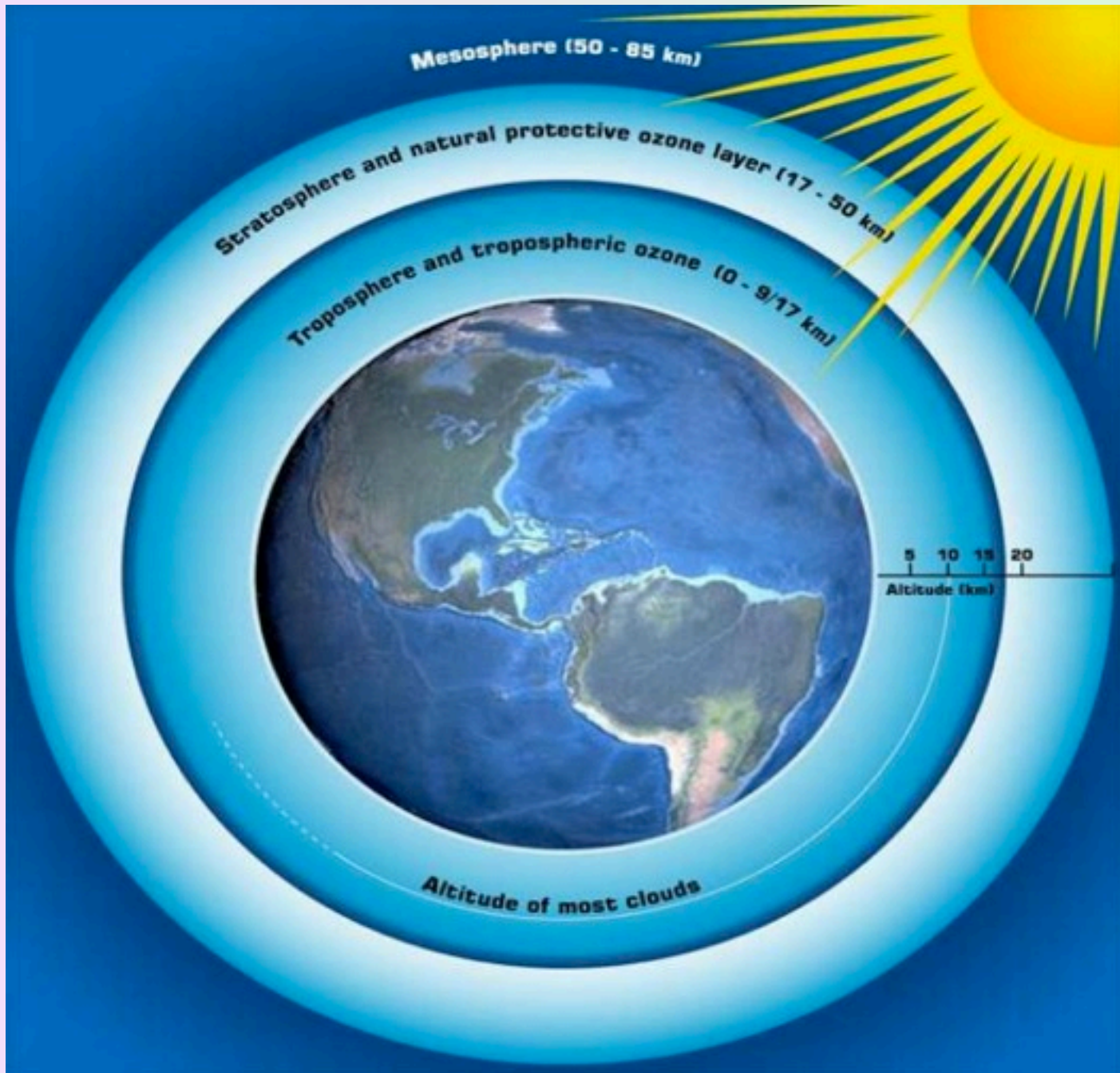
Ozone

- a chemical located in the stratosphere that absorbs most uv radiation from the sun.
- naturally occurring
- made up of three oxygen atoms

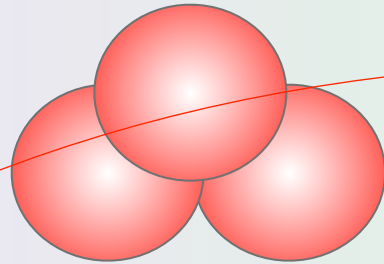
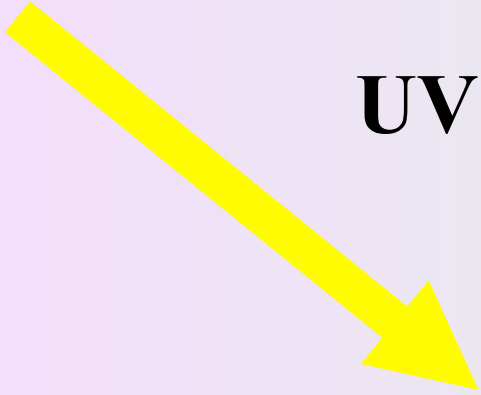
OZONE O₃



- Located in the Stratosphere
- Protects us from ultraviolet radiation
 - Exposure to UV radiation can cause
 - Melanomas -Skin cancer
 - Eye cataracts
 - Decreased crop yields
 - Increased temperature of the Earth
- 2 types of ozone
 - Good ozone: located in the Stratosphere; protects us from UV exposure
 - Bad ozone: located at ground level - SMOG



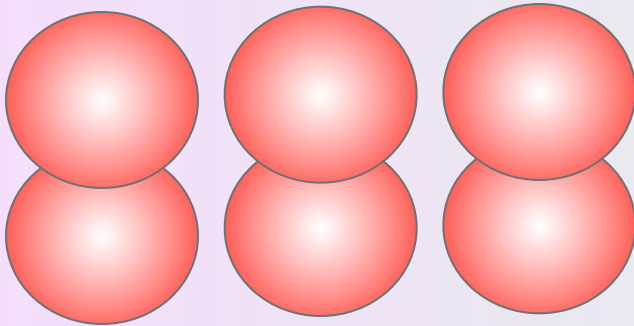
UV radiation



stratosphere



UV radiation

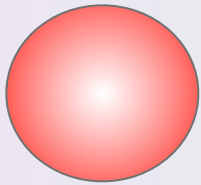
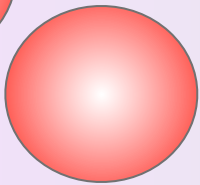
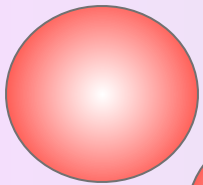
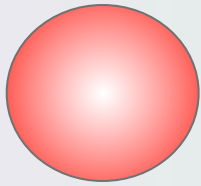
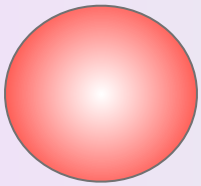
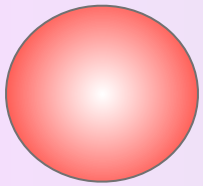


O₂

O₂

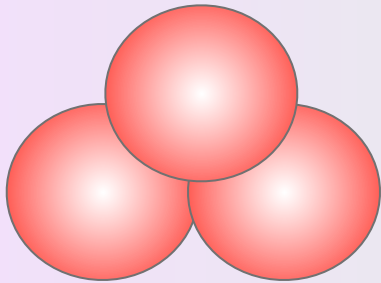
O₂



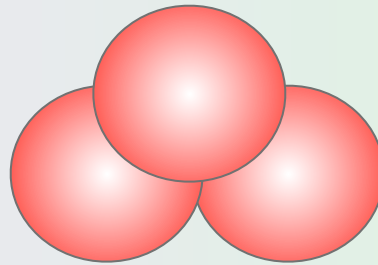


infrared radiation

heat



O₃



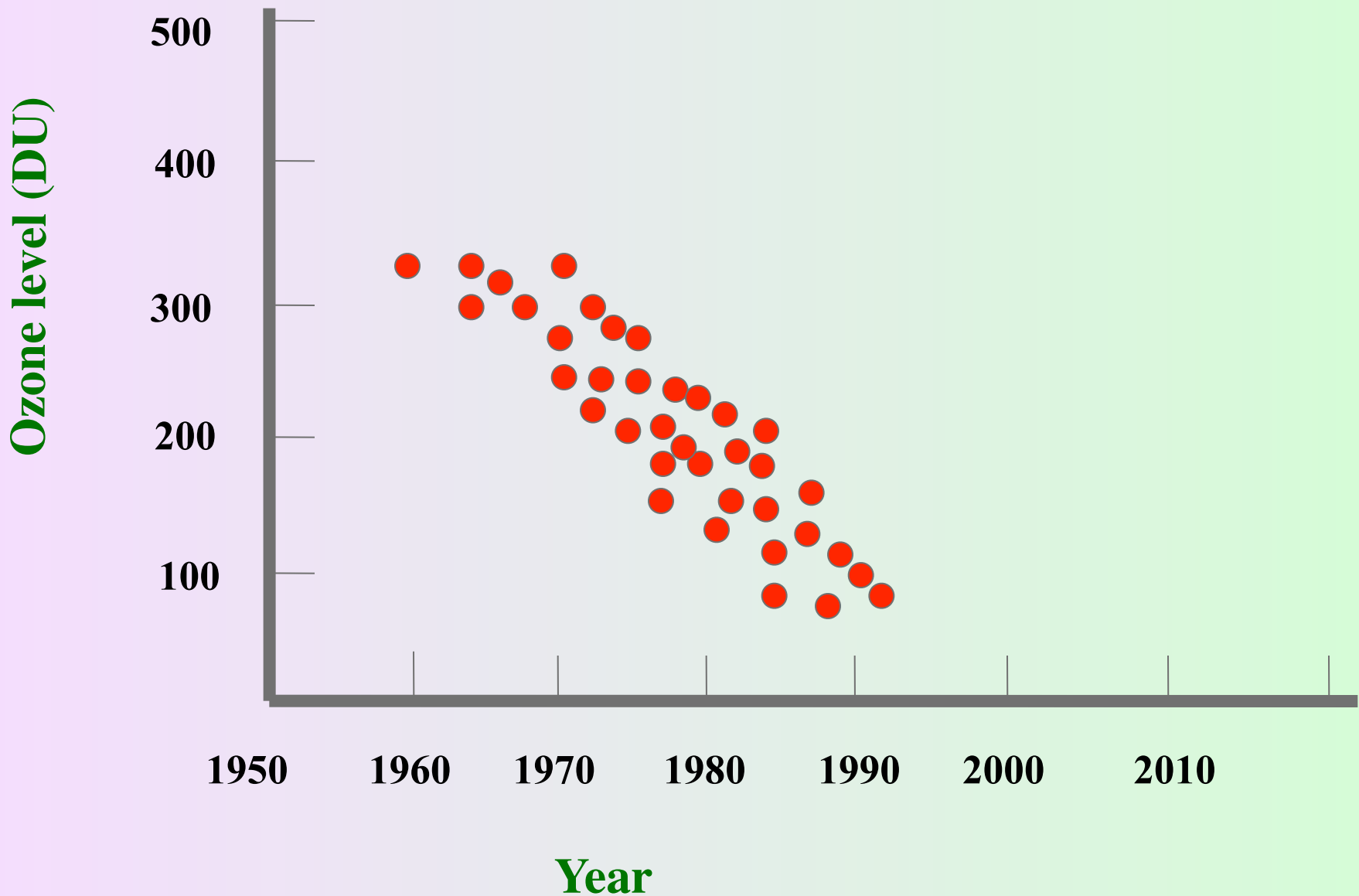
O₃

Chemists are problem solvers

Problem:

In recent years ozone has been depleted at an alarmingly fast rate.

October Ozone Concentrations



A tale of two chemicals

Ozone

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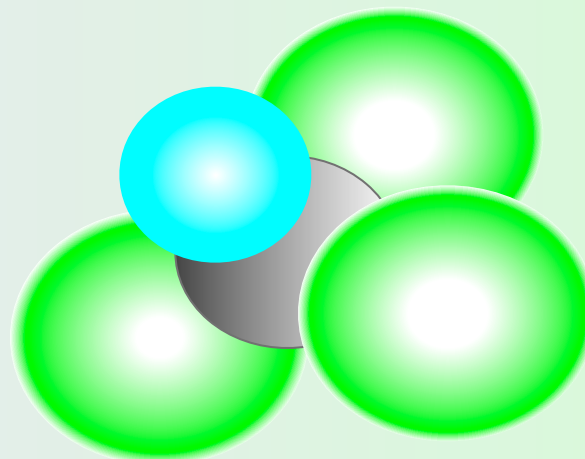
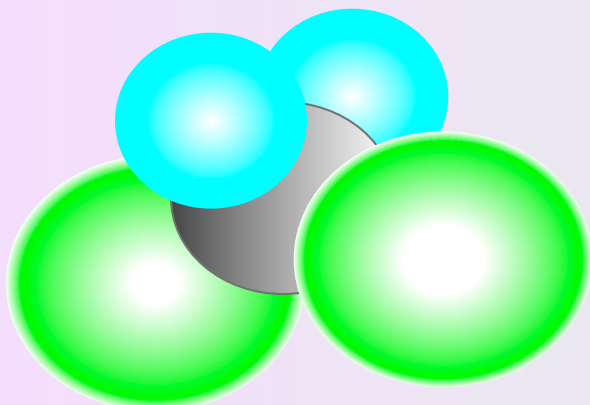
Chlorofluorocarbons (CFCs)

- a group of chemicals that contain carbon, fluorine and chlorine.
- not naturally occurring
- used as a coolant and as a propellant

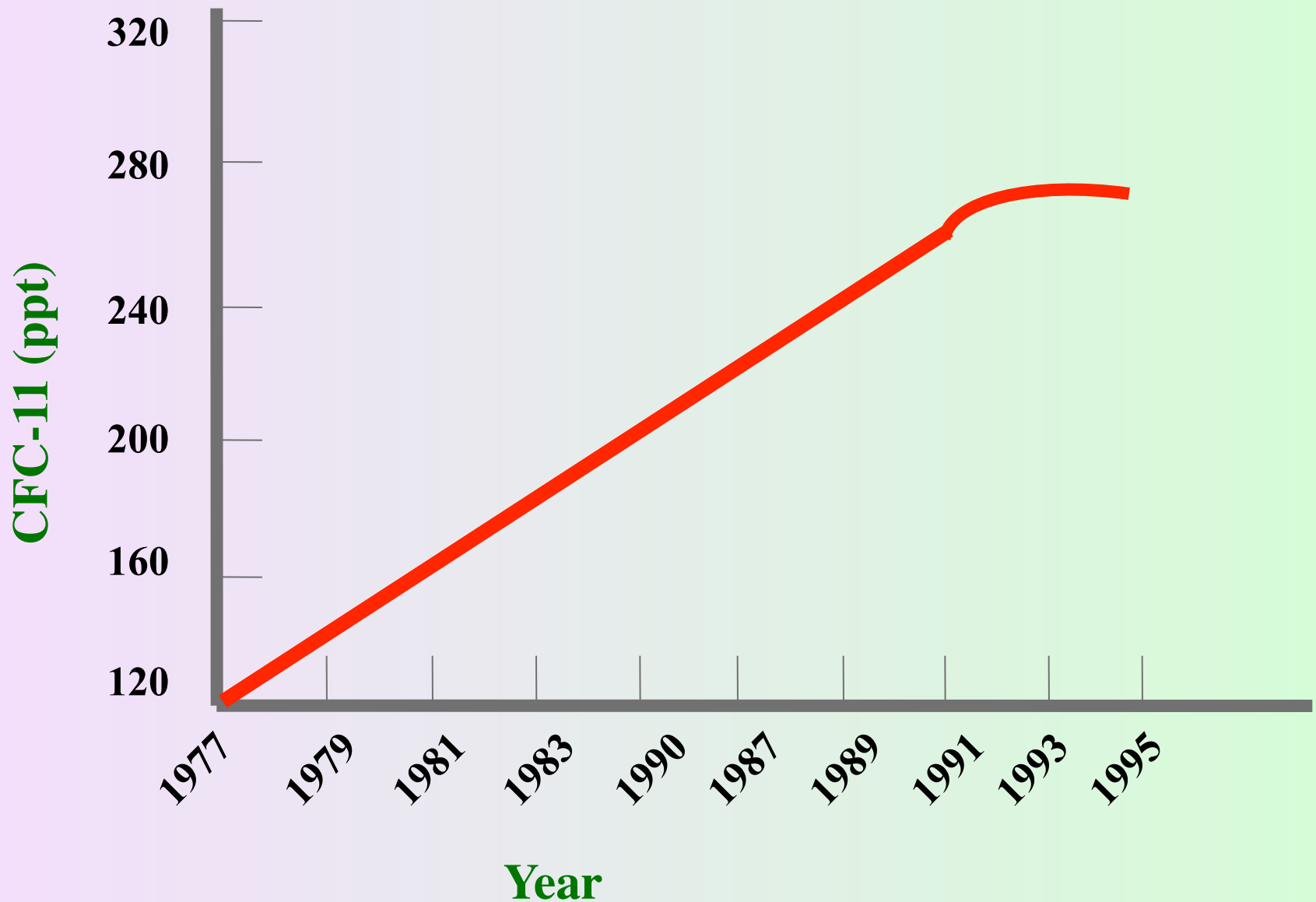
Ozone is deteriorating because . . .

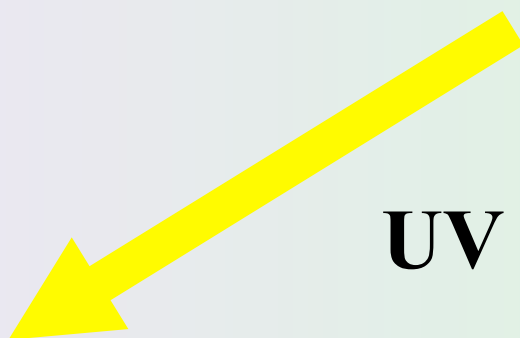
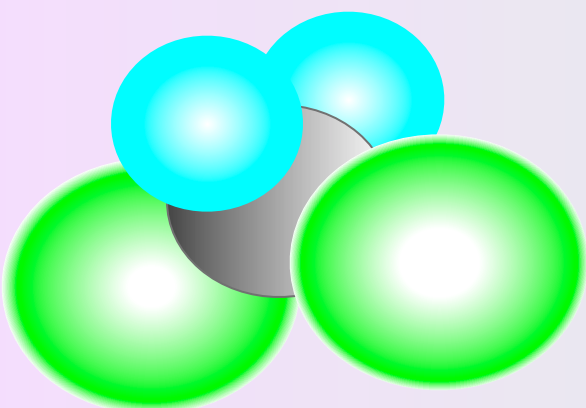
- CFC's
 - Chlorofluorocarbons
 - Found in aerosols
 - Banned in the U.S.
- Refrigerants/Cooling devices
- Pollution



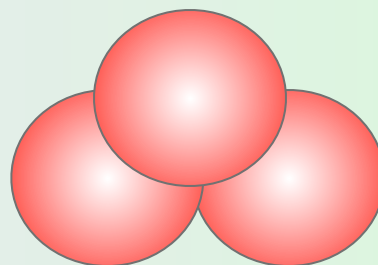


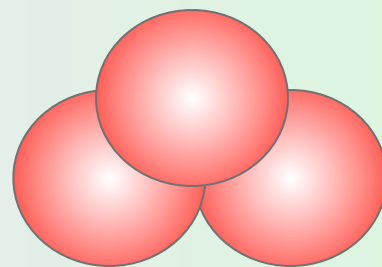
Concentration of CFCs in the Atmosphere



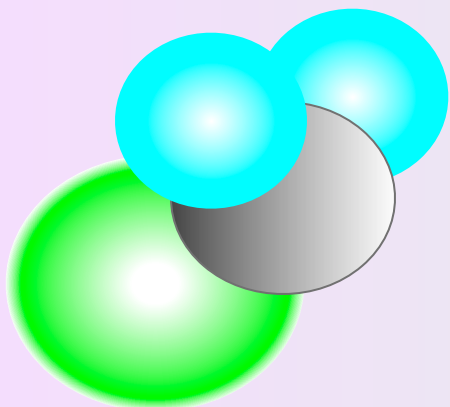


UV radiation





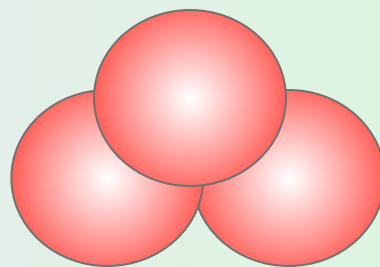
O₃



CF_2Cl



Cl

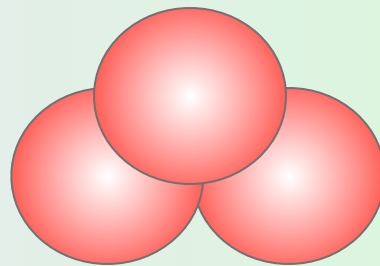


O_3

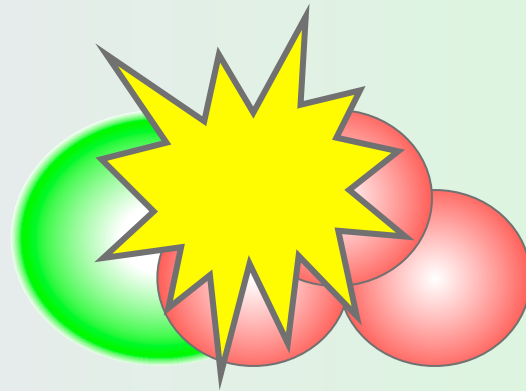


Cl

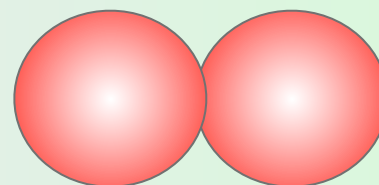
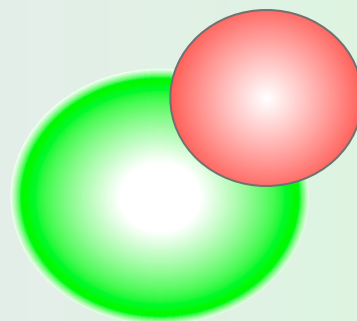
+



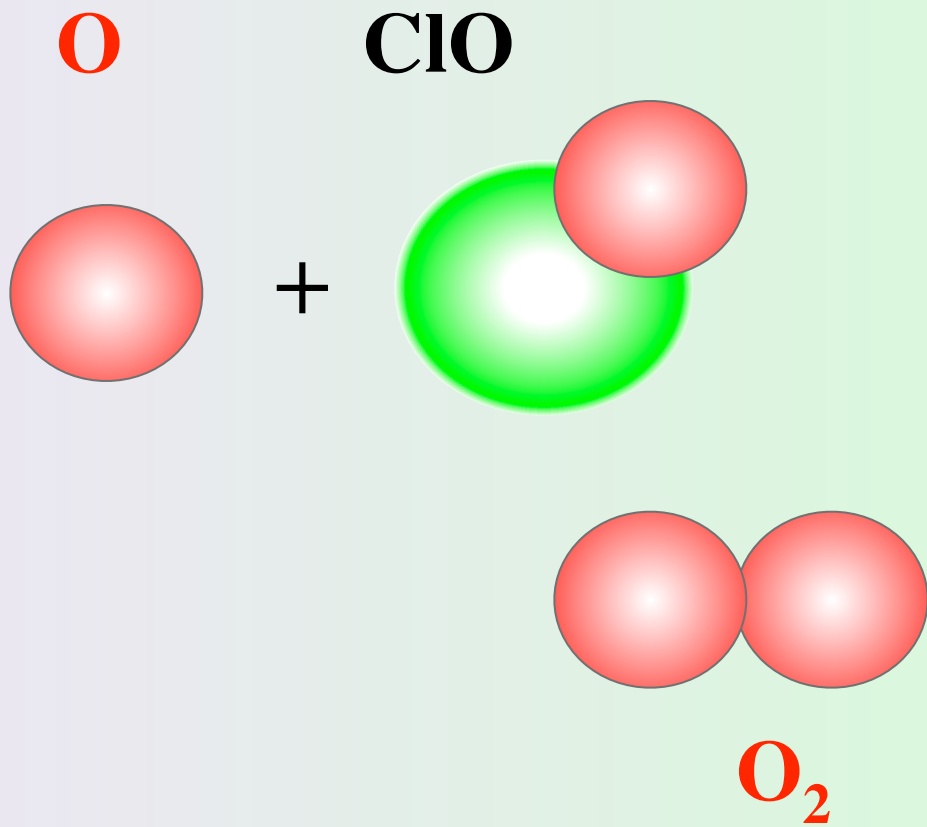
O₃

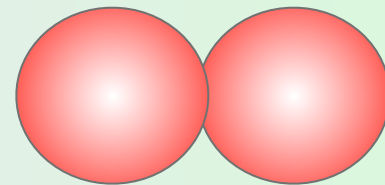
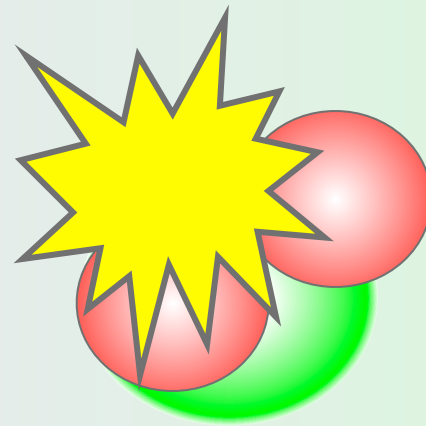


ClO

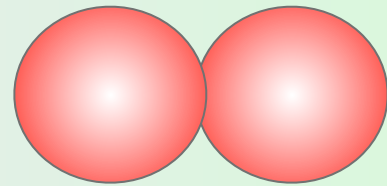


O₂

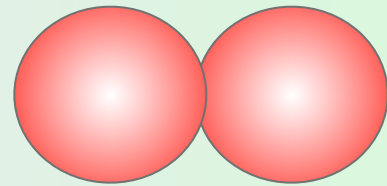




O_2



O₂



O₂

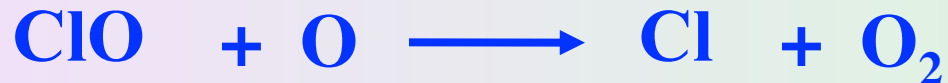
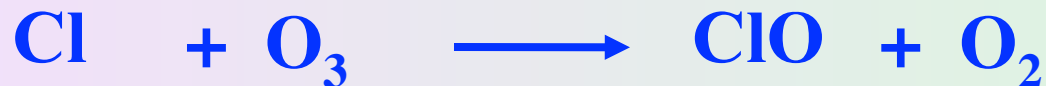
Example

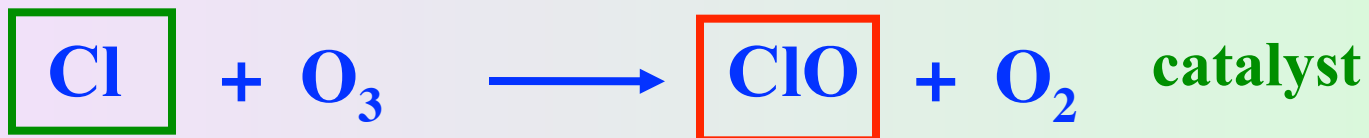
In recent years ozone has been depleted at an alarmingly fast rate by chloroflorocarbons (CFCs).

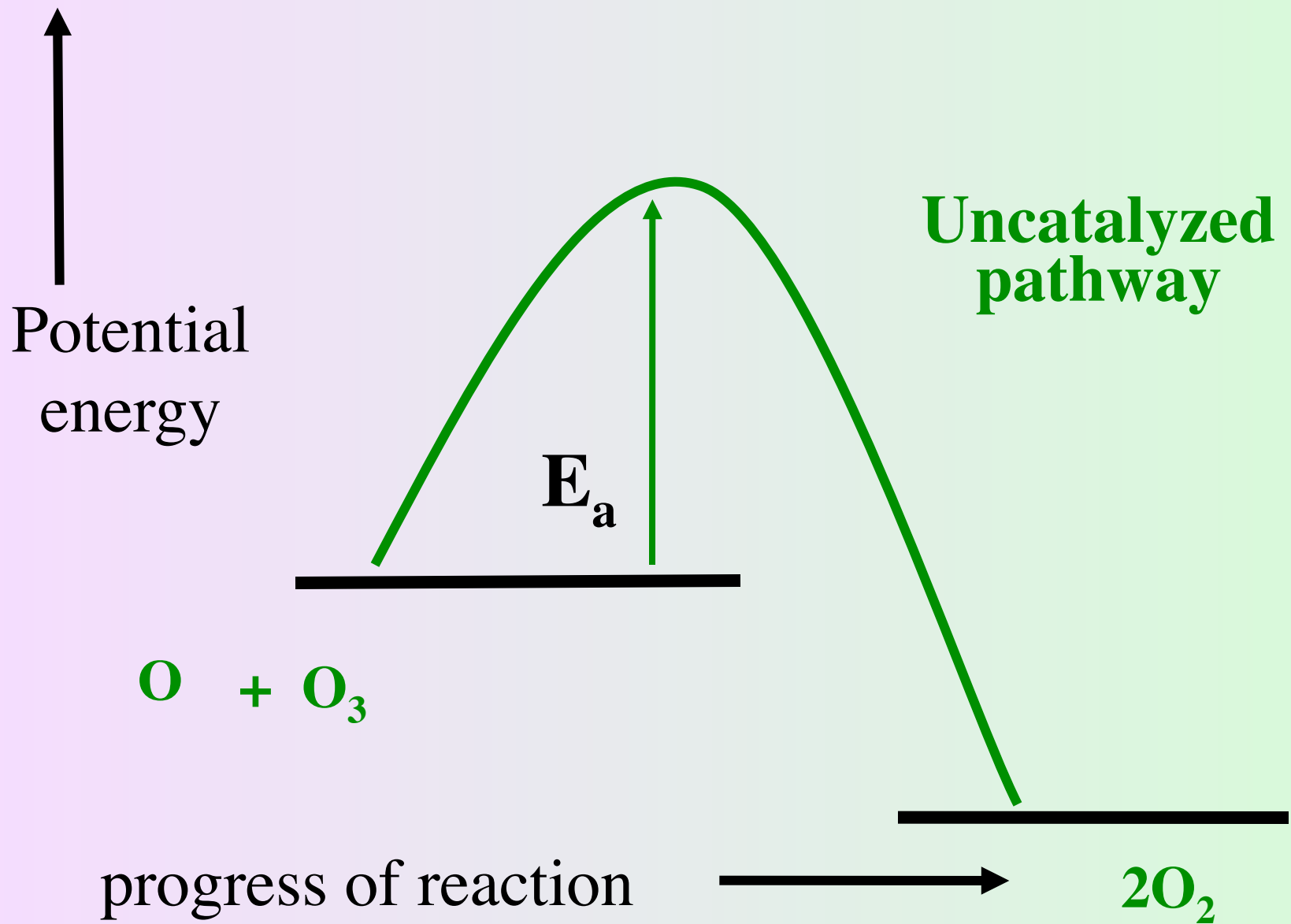
A CFC molecule such as CF_2Cl_2 is first decomposed by UV radiation:

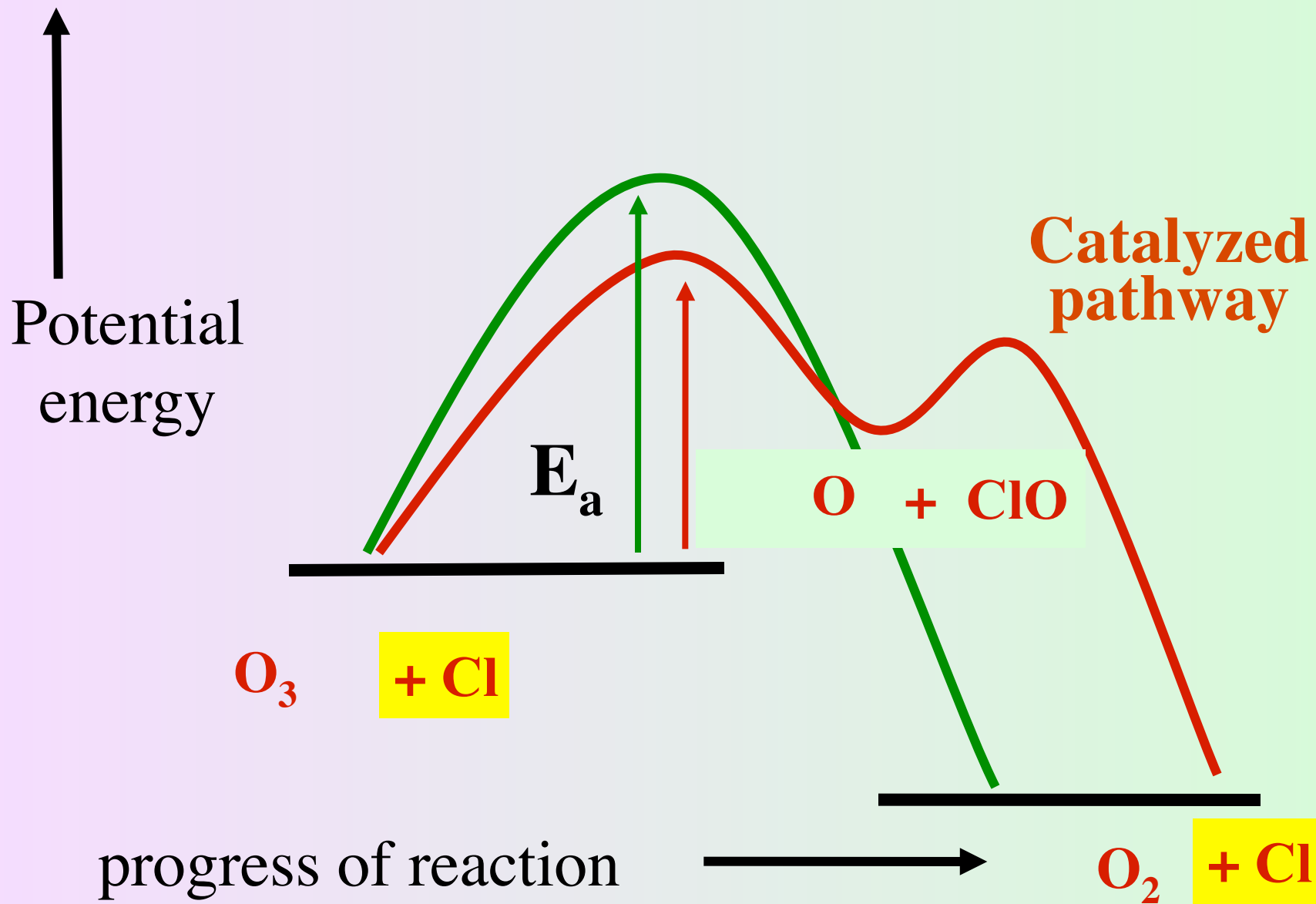


The chlorine radical then reacts with ozone as follows









chemistry

The study of matter, its structure, properties, composition and changes that matter undergoes.

chemistry

seeks to explain submicroscopic events that lead to macroscopic observations.



(slides that follow are linked to earlier ones)

law

a concise verbal or mathematical statement of a relationship between phenomena that is always the same under the same conditions

theory

**a unifying principle that explains a
body of facts and those laws that are
based on them**

The Why

hypothesis

a tentative explanation for a set of observations

leads to “if... then...” questions

test of theory