

The sun's energy reaches Earth in the form of ..... which warms the surface.

Infrared radiation  
electromagnetic radiation spectrum

Earth's surface then reradiates the energy in the form of .....

gamma radiation  
infrared radiation  
ultraviolet radiation

Most of the reradiated energy is not released into space. Instead, it is absorbed by the.....

geosphere  
atmosphere  
space

Some of the radiation is reradiated back towards Earth's surface again. This process is known as the ..... effect .

Feedback  
greenhouse  
radiation

What criteria must be met for reactant collisions to result in a successful product?

The reactants must collide with each other

The reactants must collide with enough energy and be in the right positions  
The reactants must have enough energy to form the activated complex

The collision theory qualitatively explains how chemical reactions occur and why reaction rates differ for different reactions

True  
False

More collisions correspond to a:

Faster reaction rate  
Slower reaction rate  
Constant reaction rate

Which factors increase the rate of a reaction.

increasing surface area  
increasing concentration  
increasing temperature  
all of these

Why does a higher concentration increase the rate of reaction?

it increases the amount of reactants  
it lowers the activation energy  
it increases the energy of particle collisions  
it increases the frequency of particle collisions

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A temperature increase causes the particles .....

to slow down  
move faster  
collide higher  
in the right order

List four factors that affects the rate of a reaction

temperature  
Concentration  
Surface area  
Volume  
Catalysts

Smaller particle size allows for a \_\_\_\_\_ surface area to be exposed for the reaction.

Larger  
Smaller

Which has more surface area?

Large chunks of chalk

Cube of sugar  
powdered sugar  
Small chunks of sugar

Which two gases make up most of Earth's atmosphere but absorb very little infrared radiation?

- A) Carbon dioxide and methane
- B) Nitrogen and oxygen
- C) Hydrogen and helium
- D) Ozone and chlorofluorocarbons

By how much do greenhouse gases keep Earth's surface warmer than it otherwise would be?

- A) About 15°C
- C) About 35°C
- D) About 45°C

Global warming potential (GWP) measures a gas's heat-trapping capacity compared to which baseline gas?

Nitrogen  
Oxygen  
Methan  
CO<sub>2</sub>

Why have chlorofluorocarbons been banned?

- A) They lower the Global Warming Potential.**
- B) They destroy the protective ozone layer.**
- C) They absorb too much nitrogen.**
- D) They cool the atmosphere too quickly.**

What does radiant energy transform into when gas molecules absorb electromagnetic radiation?

**Potential Energy**  
**Kinetic Energy**  
**Chemical Energy**  
**Nuclear Energy**

Which of the following is NOT mentioned as one of the three general forms of molecular motion?

- B) Bending
- C) Twisting**

**D) Rotating**

What percentage of total atmospheric infrared radiation absorption is caused by water vapor alone?

20%

30%

50%

70%

Why does water vapor have both warming and cooling effects?

**It destroys stratospheric ozone.**

- B) It absorbs some wavelengths of incoming sunlight**
- C) It locks carbon dioxide in the soil.**
- D) It completely reflects all types of radiation.**

What dangerous type of solar radiation is ozone (O<sub>3</sub>) highly effective at absorbing?

- A) Infrared radiation**
- B) Microwave radiation**
- C) Ultraviolet radiation**
- D) Visible light radiation**

Where does about half of the radiation absorbed and reemitted by greenhouse gases go?

- A) Directly out into space**
- B) Back to Earth's surface**
- C) Into the ozone layer**
- D) It disappears entirely**

How is glacier ice formed ?

- A. Through the freezing of groundwater**
- B. From the compaction of snow year after year**
- C. By the rapid freezing of ocean waves**

What can be inferred about heavy isotopes O<sup>18</sup> and H<sup>2</sup> when temperatures are cold?

- B. They are less abundant in the ice.**
- D. They disappear entirely from the record.**
- C. They turn into pollen.**

What are the brief, warm periods between ice ages called?

- A. Oscillations**
- B. Glacials**

### C. Interglacials

What is the primary cause of the repeating 100,000-year climate cycle?

- A. Volcanic eruptions
- B. Changes in the amount of pollen
- D. Oscillations in the elliptical shape of Earth's orbit

Why are ice cores sometimes shaved into slices as thin as 120 micrometers?

- A. To measure the exact age of the glacier
- B. To observe monthly changes in temperature, pollen, and ash
- C. To make the ice easier to melt for drinking water
- D. To remove heavy isotopes from the sample

During the peak of the last Ice Age (26,000 years ago), how much lower was the sea level compared to today?

- 25 m
- 100 m
- 125m
- 400 m

Which of the following is NOT listed as a primary cause of current sea-level rise?

- A) Melting of Antarctic and Greenland ice
- B) Thermal expansion of ocean water
- C) Melting of alpine and tidewater glaciers
- D) Increased underwater volcanic activity

Approximately how much ice are Greenland and Antarctica losing combined each year?

- A) 100 million tons
- B) A quarter-trillion tons
- C) More than a half-trillion tons
- D) One trillion tons

