

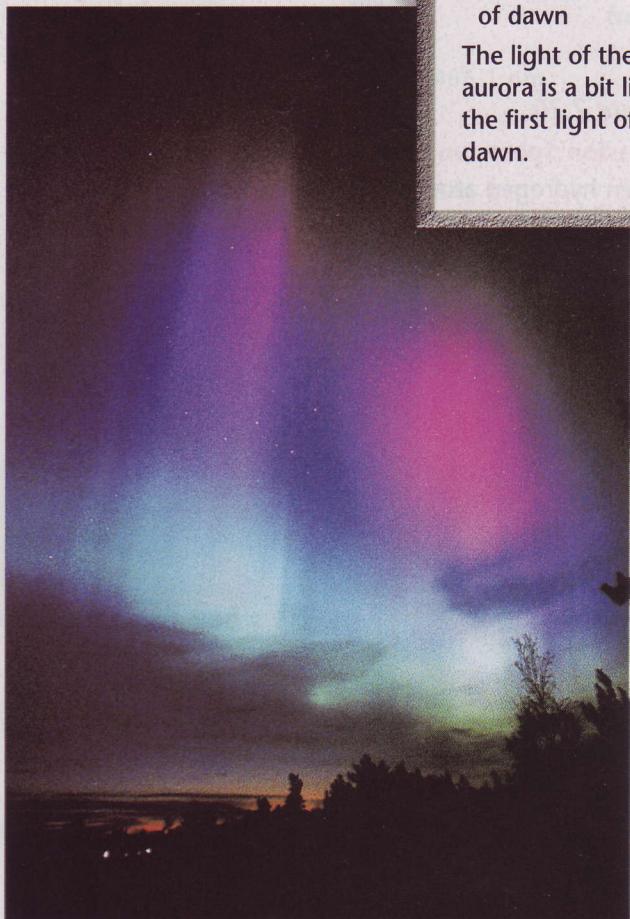
Aurora Borealis

In real life, you may never see colored lights such as those brightening the night sky in the photograph. You are looking at the *aurora borealis*—a fantastic light show seen only in high northern latitudes. The lights were once thought to be reflections from the polar ice fields. An aurora occurs from 100 to 1000 km above Earth.

Cause of auroras An aurora is attributed to solar wind, which is a continuous flow of electrons and protons from the sun. These high-energy, electrically charged particles become trapped by Earth's magnetic field, and they penetrate to the ionosphere. There, the particles collide with oxygen and nitrogen molecules and transfer energy to them. The energy causes electrons in these atoms and molecules to jump to higher energy levels. When the electrons return to lower energy levels, they release the absorbed energy as light.

Characteristics of the aurora When the frequencies of radiant energy released by the molecules are in the visible range, they can be seen as an aurora. Atomic oxygen, releasing energy at altitudes between 100 to 150 km, emits a whitish-green light. Molecular nitrogen gives off red light.

The aurora is most frequently seen in polar latitudes because the high-energy protons and electrons move along Earth's magnetic field lines. Because these lines emerge from Earth near the magnetic poles, it is there that the particles interact with oxygen and nitrogen to produce a fantastic display of light. Auroras also may be seen in extreme southern latitudes. These displays are the *aurora australis*.



WORD ORIGIN

aurora:

Aurora (L) the Roman goddess of dawn

The light of the aurora is a bit like the first light of dawn.

Connecting to Chemistry

- Applying** How does the *aurora borealis* relate to the structure of an atom?
- Inferring** What characteristic of an aurora indicates that it is caused by solar winds rather than a reflection of polar ice?