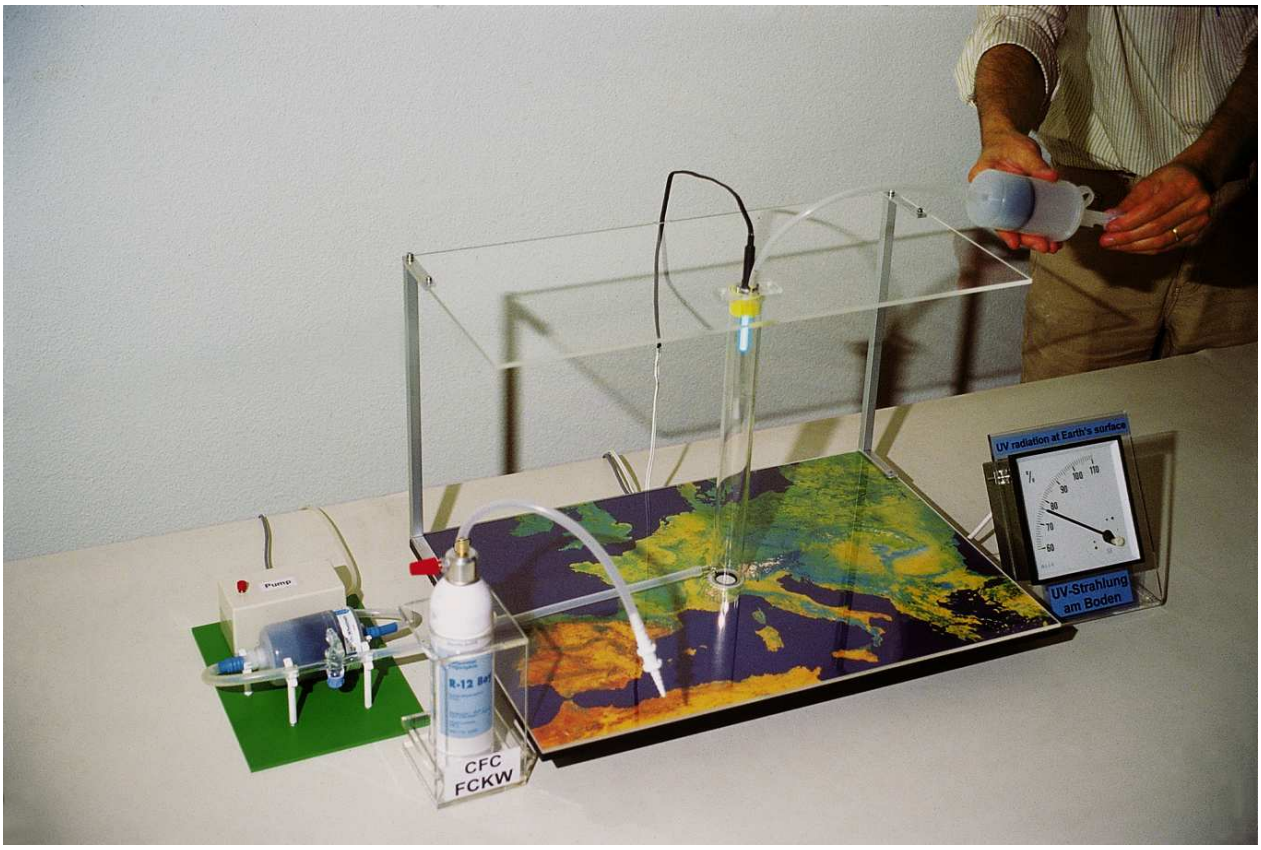

Photo C. Hilbrand, Luzern

Ozone Hole Experiment

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Let us consider a column of air which extends from the Earth's surface to the upper limit of the atmosphere. In the experiment, the situation is modelled by a vertical glass tube, a map of Europe and a horizontal acrylic glass plate, respectively. A lamp on top of the glass tube (in „outer space") emits invisible ultraviolet radiation („solar radiation") which enters the column of air. The amount of radiation which reaches the ground and affects biological organisms is measured and displayed (UV radiation on the „Earth's surface").

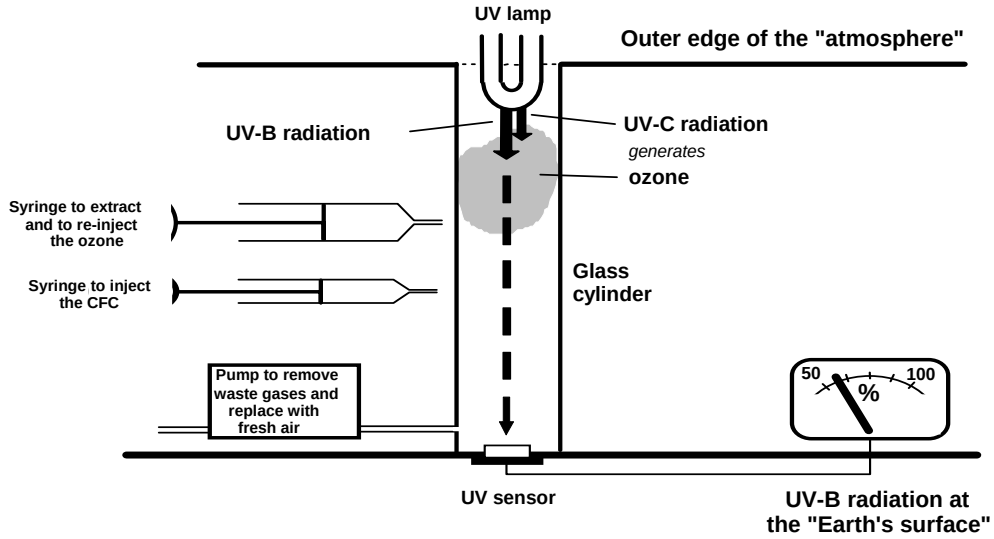
- **Does ozone gas stop UV radiation?**
- **Do CFCs destroy ozone and thus increase UV radiation at the Earth's surface?**
- **Where does the ozone in the atmosphere come from?**

Expert answers to these questions are readily available though often not very convincing. Little of the information can be seen, experienced or verified. Do we simply have to believe the experts?

The experiment allows the physical and chemical processes to actually take place, thus providing immediate and impressive answers.

- **The ozone layer in the stratosphere stops the UV-B radiation from the sun.**
- **This natural gas shield is being destroyed by industrial CFCs and thus more and more radiation reaches the Earth's surface.**
- **The ozone is generated by the UV radiation itself (UV-C) which transforms oxygen into ozone provided there is no CFC.**

The experiment has been developed in an interdisciplinary research project at the University of Basel, Switzerland. The experiment is easy to understand and to conduct. Using UV light, ozone and CFC, an actual small ozone hole is produced. The experiment allows a layman to see all the relevant phenomena for him- or herself.



An acrylic glass plate horizontally mounted some 30 cm above a satellite picture of Europe marks the outer edge of the atmosphere. A special lamp emits UV radiation, which is a part of the solar spectrum. This radiation passes through the „atmosphere" (glass cylinder). Its high energy part, the UV-C, is completely absorbed in the „stratosphere" (the upper part of the glass cylinder) upon the transformation of oxygen into ozone. The ozone, in turn, absorbs the remaining UV-B radiation which is harmful for biological organisms. A hole in this „ozone layer" is readily displayed by the instrument as an increase in radiation at the „Earth's surface". This happens when the ozone is extracted manually with a syringe or by an electric pump or when CFC is injected. The latter process chemically destroys the ozone (this is what actually takes place in the stratosphere). The reverse, i.e. the building up of the ozone layer in clean, CFC-free air can also be demonstrated by the slow decrease of radiation at the Earth's surface. All these processes can be repeated at will.