

RADON

Chemical Description

Radon is a radioactive noble gas formed by the decay of [Radium](#) which is itself a decay product of uranium ([#UMN Kids](#) and [#ALA, 2008](#)). It is one of the heaviest gases, with atomic number of 86 and atomic mass 222 g/mol. Radon is colorless at standard temperature and pressure, is an odorless, tasteless, invisible gas that is capable of easily mixing with air. At a temperature below its freezing point, it has a brilliant yellow phosphorescence¹. It is chemically inert and essentially non-reactive, but is highly radioactive with a short half-life. It decays by alpha-particle emission, and has a half-life of 3.8 days. The decay products are solids and are called daughters or progeny ([#UMN](#)). Some of its famous progeny include polonium-218, 214 and [210](#) are alpha particle emitters. [polonium 210](#) is thought to be responsible for the poisoning death of Russian ex-KGB agent [Alexander Litvinenko](#). Finally, radon is highly soluble in non-polar [Solvents - Chemical Profiles and External Links](#) and moderately soluble in cold water.

Radium Sources

Natural Sources

Radon forms from the breakdown of the natural elements uranium and radium from various rocks, soils, and water sources ([#UMN Kids](#)). Soils and rocks containing high levels of uranium, such as granite, phosphate, shale and pitchblende are natural sources of radon ([#ALA, 2008](#)). Radon is continually being formed in soil and released to air as a result of the extended half-lives of uranium and radium and their abundance in the earth's surface. Atmospheric radon is not an issue of health concern because the radon is rapidly diluted to low levels by circulation throughout outdoor air ([#UMN](#)). The [U.S. Environmental Protection Agency \(EPA\)](#) estimates that nearly 1 out of every 15 homes in the U.S. has indoor radon levels at or above the [EPA's](#) recommended action guideline ([#ALA, 2008](#)).

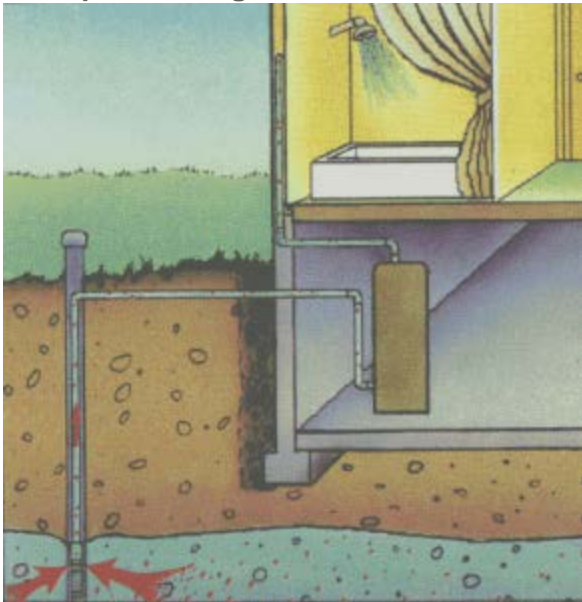
Radon Transport

Transport Throughout Soil

After radon is produced at the soil particulate level from the radioactive decay of radium, it is released into small air or water containing pores between soil and rock particles and transported

through the soil primarily through [alpha recoil](#) and the mechanical flow of air and water throughout the soil ([#UMN](#)).

Transport Through Water



Groundwater that comes into contact with radon-containing rock transport the radon but the level of radon in groundwater should be very low. Much of the radon will decay because it is highly soluble, has a short [Half Life](#), and radon is released as a gas into the atmosphere once the groundwater reaches the surface ([#UMN](#)). Rural household wells could have potentially high levels of radon contamination depending upon the level of uranium content of the rock around the aquifer, distribution of the aquifer relative to the rock, and the groundwater flow patterns ([#UMN](#)).

Transportation Into and Throughout the Indoors

Radon can enter indoors through ([#UMN](#)):

- ♣ Cracks in concrete slabs
- ♣ Spaces behind brick veneer walls that rest on uncapped hollow-brick foundation
- ♣ Pores and cracks in concrete blocks
- ♣ Floor-wall joints
- ♣ Exposed soil, as in a sump
- ♣ Weeping (drain) tile, if drained to open sump

Source : <http://www.toxipedia.org/display/toxipedia/Radon>