

stands *continuously* 1.5 degree higher than the temperature of the air of the room. On studying for some time in a sealed glass tube a radium compound charged the apparatus so strongly with electricity that an electric spark perforated the glass when it had been slightly weakened by scratching it with a diamond. The amount of heat given off is relatively very great. An ounce of radium would give off *every hour* enough heat to raise the temperature of an ounce of water from the freezing to the boiling point. This discharge of heat goes on *continuously*. This heat is believed to be generated by the disintegration of the radium atom, atoms of other elements being formed from it. Radium itself may be a product of the transmutation of uranium and thorium. As radioactivity has been detected almost universally in the materials of the earth these substances are wide spread, but in such small amounts that radium is calculated to be only about 3-10,000ths as abundant as gold. Nevertheless its effect in maintaining the heat of the earth has been calculated to be sufficient to retard the cooling almost indefinitely. One consequence of this is to push back the age of the earth a great many million years beyond the point calculated from the rate of cooling of bodies. It has also been suggested that the heat of the sun may be maintained in the same way. Thus we get a glimpse of what infinity means.

Sir Wm. Ramsay discovered about 1896 that radium is constantly giving off a gas, or *emanation*, which when kept for several days changes in part at least into another gas, *helium*, first discovered in the sun by the astronomer Jansen in 1868. Ramsay had previously, 1895, obtained helium by heating the mineral cleveite. Here then was a direct transmutation of one element into another. But the rate is a very slow one. It has been calculated that it would take 1700 years for half of the radium to become so transmuted. As the earth is very old it seems that the radium must in its turn be in course of formation by the disintegration of some other element or elements, namely uranium and thorium.

Radium and its compounds are brilliantly luminous, shining continuously without any external source of energy. This luminosity is communicated to other bodies by the radiations from this wonderful substance, so that cotton, grass, paper, etc., shine under its influence. Diamonds become phosphorescent when placed near it, and can thus be distinguished from imitations, which are not so strongly affected.

The radium emanation and rays are powerful in causing chemical changes in substances exposed to its influence. Salt becomes calomel, paper becomes brittle, scorched, and full of holes like a collander. Ozone is produced in air through which radium is sending its rays. Solution of a radium salt is constantly evolving hydrogen and oxygen by the decomposition of water.

*Radiographs* can be obtained by its photographic action, just as with the X-ray machines. The difference is that the radium supplies its own energy continuously, while the X-ray tube must be kept going by a current of high tension electricity.

The skin is burned by exposure to the radions, even when glass, clothing etc., intervene. With long exposure serious injury results, so that sores are