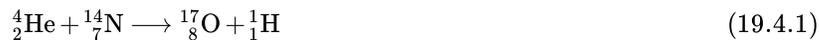# 19.4: Artificially Induced Nuclear Reactions

In 1919 Rutherford performed the first artificial nuclear reaction. He was able to demonstrate that when α particles are introduced into a closed sample of N_2 gas, an occasional collision led to the formation of an isotope of O and the release of a proton:

$$\ce{^4_2He + ^{14}_7N \longrightarrow ^{17}_8O + ^1_1H} \tag{19.4.1}$$

Since then many thousands of nuclear reactions have been studied, most of them produced by the bombardment of stable forms of matter with a beam of nucleons or light nuclei as projectiles. Particles which have been used for this purpose include protons, neutrons, deuterons $(\ce{^2_1H})$, α particles, and B, C, N, and O nuclei.

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