19: Nuclear Chemistry

Electrons (especially valence electrons) are the only subatomic particles which are involved in ordinary chemical changes, and we have spent considerable time describing the rearrangements they undergo when atoms and molecules combine. However, another category of reactions is possible in which the structures of atomic nuclei change. In such **nuclear reactions** electronic structure is incidental—we are primarily interested in how the protons and neutrons are arranged before and after the reaction. Nuclear reactions are involved in transmutation of one element into another and in natural radioactivity. In these sections we consider nuclear reactions in more detail, exploring their applications to nuclear energy, to the study of reaction mechanisms, to qualitative and quantitative analysis, and to estimation of the ages of objects as different as the Dead Sea scrolls and rocks from the moon.