portant feature of this method is that the sample tested can be preserved in its original form and also that only a very minute sample need be tested. This technique involves, for example, taking a sample from an art object—it may be a pinpoint speck of paint from a painting, a tiny chip from an archaeological artifact, or an almost invisible streak from a coin or metal object—and exposing this sample to a flux of neutrons produced by a reactor, isotope source, or particle accelerator. Traces of various chemical elements can be identified and measured by analyzing the energy, intensity, and rate of decay of the radiation emitted by the radioisotopes produced by the neutron irradiation of these elements. Through use of appropriate nuclear radiation detection equipment and computer techniques, the elemental composition of the artifact is established, sometimes with interesting historical implications.

Neutron activation analysis of old coins is now carried out extensively to supplement numismatic studies of design, legends, mintmarks, dates, denominations, and weights. Some of this work is conducted through neutron irradiation in a reactor while other methods include the use of a plutonium–beryllium source of neutrons that is less intense but more portable than that available in a reactor. The isotope californium-252 may be an important source of such neutrons in the future. Knowledge of silver or gold content of ancient coins enables the historian who has no other records to go by to establish the time and extent of any debasement as well as reform of the coinage. These fluctuations in the money economy are considered one of the strongest indications of change—social, political, demographic, or environmental—in a medieval society. In other words, the economic historian expects to find that, in periods when the silver content of an early nation's coins was small, that nation was experiencing a famine or internal strife or was at war with another country.

At the University of Michigan work has been under way for several years to track down the source of the volcanic glass obsidian found in the prehistoric artifacts of the Hopewell Indians in the Great Lakes Region. Obsidian is not found geologically anywhere near that area the closest sources being 1500 miles away in Mexico, New Mexico, and the western United States. By irradiating obsidian samples from these various locations, Professor Adon Gordus found that the elemental composition of the Hopewell obsidian arrowheads was identical only to that of obsidian from a volcanic source in Yellowstone National Park. This evidence not only confirmed that contacts in prehistoric culture stretched over 1600 miles, but it also indicated a particular trade-route pattern that existed in this country more than 2000 years ago.