In 1946 the Institute for Nuclear Physics Research (IKO) at Amsterdam was founded as a typical post World War II effort to cope with the surge in scientific research, primarily in the U.S.A. Far-seeing, also chemists were given an opportunity to explore these new realms of science. Consequently the chemistry department of IKO became the first integrated group of its kind in the Netherlands engaged in radiochemical research. Ever since IKO has been operated as a tripartite foundation with the Dutch government, Philips and the City of Amsterdam as partners. As a matter of fact Philips can be considered the cradle of IKO since already during the war the Institute’s cyclotron had been designed secretly in the Philips factories at Eindhoven. In the near future IKO will officially merge with high energy physicists in a new and larger organization, the National Institute for Nuclear and High Energy Physics (NIKHEF). At present the Institute encompasses almost 250 workers — including a Philips research group — out of which near to 30 are members of the chemistry department.

Past, present and future of the doings of the chemistry department can be described as follows.

The past finds its personification in its first director, Professor Dr. A.H.W. ATEN Jr. In the beginning the investigations dealt with more or less conventional tracerwork using long-lived radionuclides produced in nuclear reactors.

However, this changed rapidly with the synchrocyclotron coming into operation in 1947. The chemists familiarized themselves quickly with this particle accelerator, at the time a gigantic apparatus in terms of chemical research. As a result more than twenty radioisotopes could be put on the chart of nuclides as actually discovered in those years at IKO. Both this “isotope hunting” and the service rendered to the nuclear spectroscopists in the Institute and elsewhere (even outside the Netherlands) formed the basis of an extensive experience with the analytical chemistry of elements throughout the periodic system including heavy elements up to Z = 98 (californium). From the same early period stems the present interest in the chemistry of astatine and the chemical effects of nuclear transformations (hot atom chemistry), the latter at first primarily in inorganic systems. In addition to such
purely chemical matters attention was given to many other fields of interest. More particularly we would like to mention studies conducted in international cooperation on the absolute calibration of radionuclides and of various types of neutron sources. This logically led to measurements on the spectral distribution of the neutrons emitted and on the dosimetry of neutrons.

New momentum was gained when the 85 MeV linear electron accelerator came into full operation in 1967. More particularly, its great merits with respect to activation analysis with high energy photons generated as Bremsstrahlung of the decelerated electrons was clearly demonstrated in many instances. Parallel to photo-nuclear activation analysis, also the cyclotron was used for activation analysis by employing its beams of charged particles and the secondary fast neutrons. This in turn triggered more recent investigations whereby prompt and delayed gamma-rays of nuclear reactions and also X-rays induced by beams of charged particles, were tested on their validity in chemical analysis.

The present can be best characterized as sort of a transition state. As of a few years emphasis has been laid upon more typical chemical aspects of the research program: a shift from "nuclear" chemistry to "radio" chemistry. In hot atom chemistry we embarked upon organic systems, more particularly aromatic compounds and gases, thereby using primarily halogen recoils such as $^{18}$F and $^{34,38}$Cl, but also others such as $^{38}$S. The latter isotope is hard to get at and is produced either by the reaction $^{40}$Ar ($\gamma, 2p$)$^{38}$S or by $^{40}$Ar(p, 3p)$^{38}$S. One of the virtues of $^{38}$S next to being the only isotope of sulfur that emits gamma-rays and still is not unpractically short-lived (T = 3 h), is that it decays to $^{38}$Cl which itself is radioactive (T = 34 m). This makes it possible to obtain information on the chemical effects associated with radioactive decay in comparison with chlorine recoiling from nuclear reactions.

Of crucial importance was the decision of a few years ago to expend both on (pulsed) radiation chemistry and on research related to the application of (short-lived) accelerator produced radionuclides in other disciplines, notably nuclear medicine.

As for the pulse radiolysis project, this not only takes advantage of the presence in the Institute of one of its rather special facilities, the electron accelerator, it should also be considered an undertaking complementary to research in hot atom chemistry since both are fundamentally related to the localized deposition of energy by different types of radiation.

The pulse radiolysis investigations in progress deal with aqueous systems, more particularly with the role (transition-) metal ions play in such environments.

As for the potential bio-medical (and other) applications of short-lived isotopes, its rapidly growing interest was timely recognized and today a substantial effort is