

FOURTH EDITION

Radiochemistry & Nuclear Chemistry

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The science of the radioactive elements and radioactivity in general is rather young compared to its maturity. In 1895 W. Roentgen was working with the discharge of electricity in evacuated glass tubes. Incidentally the evacuated glass tubes were sealed by Blank of England sealing wax and had metal plates in each end. The metal plates were connected either to a battery or an induction coil. Through the flow of electrons through the tube a glow emerged from the negative plate and stretched to the positive plate. If a circular anode was sealed into the middle of the tube the glow (cathode rays) could be projected through the circle and into the other end of the tube. If the beam of cathode rays were energetic enough the glass would glow (fluorescence). These glass tubes were given different names depending on inventor, e.g. Hittorf tubes (after Johann Hittorf) or Crookes tubes (after William Crookes). Roentgens experiments were performed using a Hittorf tube.

During one experiment the cathode ray tube was covered in dark cardboard and the laboratory was dark. Then a screen having a surface coating of barium-platinum-cyanide started to glow. It continued even after moving it further away from the cathode ray tube. It was also noticed that when Roentgens hand partly obscured the screen the bones in the hand was visible on the screen. A new, long range, penetrating radiation was found. The name *X-ray* was given to this radiation. Learning about this, H. Becquerel, who had been interested in the fluorescent spectra of minerals, immediately decided to investigate the possibility that the fluorescence observed in some salts when exposed to sunlight also caused emission of X-rays. Crystals of potassium uranyl sulfate were placed on top of photographic plates, which had been wrapped in black paper, and the assembly was exposed to the sunlight. After development of some of the photographic plates, Becquerel concluded (erroneously) from the presence of black spots under the crystals