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| **" The half life (*t*1/2) is the name given to this value which Libby measured at 5568+/-30 years. This became known as the Libby Half Life." Waikato University Radiocarbon Lab Website**  **Libby used modified Geiger counters to measure radioactivity. "These are devices to detect and measure ionizing radiation, as emitted from radioactive sources."** [**www.mathematik.uni-marburg.de**](http://docs.google.com/www.mathematik.uni-marburg.de) **.**  **But after the discovery the development of the dating method lead to two other techniques for dating. The conversion of carbon in the sample into CO2 gas which can then be measured was the next step in the development of Carbon dating. This method developed after Libby's findings is called Liquid Scintillation Counting. Broser and Kallman were the scientists who discovered the technique in the 1940s. They found that organic compounds or scintillators become florescent when exposed to ionizing radiation. The Waikato website again explains this process. " Each fluorescence event is proportional to a radioactive decay event, and the frequency of these events is directly proportional to the number of 14C atoms present in the sample." In this method Benzene is used as the scintillation solvent. In the website of the Radiocarbon Laboratory of the University of Zurich, Switzerland ,** [**www.geo.unizh.ch/c14/,**](http://docs.google.com/www.geo.unizh.ch/c14/) **the process is also summed up well.**  **"The benzene is produced as follows: Carbon dioxide, obtained by burning the sample, reacts with metallic lithium to form lithium carbide. The lithium carbide is hydrolyzed to acetylene which is subsequently converted to benzene by catalytic trimerisation. A small amount of Carbon dioxide is taken during the above process to enable the measurement of the stable isotope ratio 13C/12C. Scintillation counting results are statistically analyzed and reported as conventional radiocarbon ages corrected with 13C values."**  **The picture below is the synthesis line used for converting carbon dioxide into benzene which is located at the University of Zurich.**  **The second technique developed after LSC is more widely used. This is called Accelerator Mass Spectrometry. This involves directly measuring the radioactivity of a sample. The Zurich University website again gives a good description.**  **" The radiocarbon age is calculated from the measured ratio of carbon isotopes. Samples are chemically pre-treated and burned in sealed quartz glass ampoules. The resulting carbon dioxide gas from the ampoule is converted to graphite by one of the machines shown below."**  **"Mark II" Prototype"**  **The next step is explained in this quote from the Waikato website:**  **"The Graphite is ionized by bombarding it with caesium ions and then focused into fast-moving beam (energy typically 25keV). The ions produced are negative which prevents the confusion of 14C with 14N since nitrogen does not form a negative ion. The ions enter the accelerator. As they travel to the terminal (which is at about 2MV), they are accelerated so much that when they collide with the gas molecules in the central "stripper canal", all of the molecular ions (such as 12CH2 and 13CH) are broken up and most of the carbon ions have four electrons removed making them into C3+ ions. These are then accelerated down the second half of the tandem accelerator reaching energies of about 8MeV. The second magnet selects ions with the momentum expected of 14C ions and a Wien filter checks their velocity is also correct. Finally the filtered 14C ions enter the detector where their velocity and energy are checked so that the number of 14C ions in the sample can be counted."**  ([back](http://docs.google.com/introduction.html)) ([next](http://docs.google.com/intro3.html))  [[Home](http://docs.google.com/home.html)][[Introduction](http://docs.google.com/introduction.html)][[Hypothesis](http://docs.google.com/hypothesis.html)][[Procedure](http://docs.google.com/procedure.html)][[Data](http://docs.google.com/data.html)][[Conclusions](http://docs.google.com/conclusions.html)][[Bilio/Links](http://docs.google.com/biblio.html)]  [[2001 Projects](http://docs.google.com/index.html)][[2000 Projects](http://docs.google.com/AP2000/index.html)][[1999 Projects](http://docs.google.com/AP99/index.html)][[1998 Projects](http://docs.google.com/AP98/index.html)] |