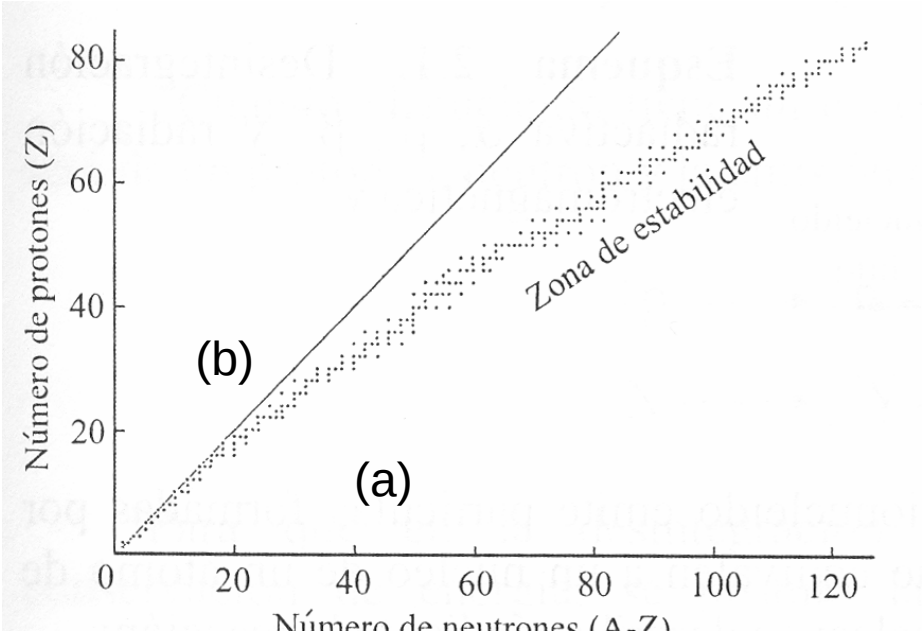
Isótopos radioactivos



Estudio previo del capítulo 1 del libro de García–Segura et al., 1996.

Relación entre la estabilidad del núcleo atómico y su número de protones y neutrones.
Los puntos en la gráfica representan los nucleidos estables. La línea continua es una recta de pendiente 1.

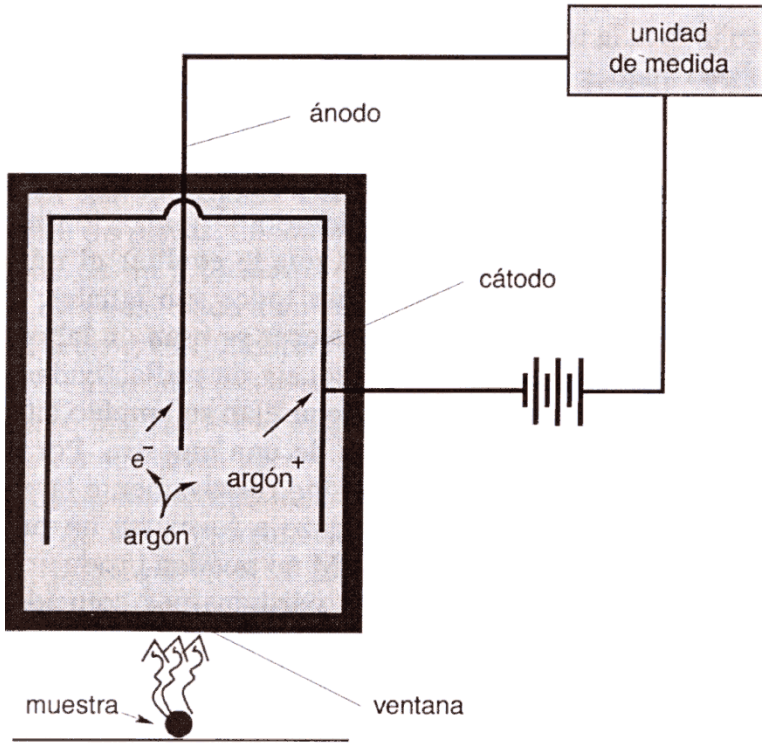
emisión α	${}^{A}_{Z}X \rightarrow {}^{A-4}_{Z-2}X + {}^{4}_{2}\alpha$	
emisión β^-	${}^{A}_{Z}X \rightarrow {}^{A}_{Z+1}X + \beta^-$	(a)
emisión β^+	${}^{A}_{Z}X \rightarrow {}^{A}_{Z-1}X + \beta^+$	(b)
emisión γ	${}^{A}_{Z}X \rightarrow {}^{A}_{Z}X + \gamma$	
conversión interna (CI)	γ ◯ ${}^{A}_{Z}X \rightarrow {}^{A}_{Z}X + e^-$ (acelerado)	
captura electrónica (CE)	$e^- \rightarrow {}^{A}_{Z}X \rightarrow {}^{A}_{Z-1}X + \gamma$	

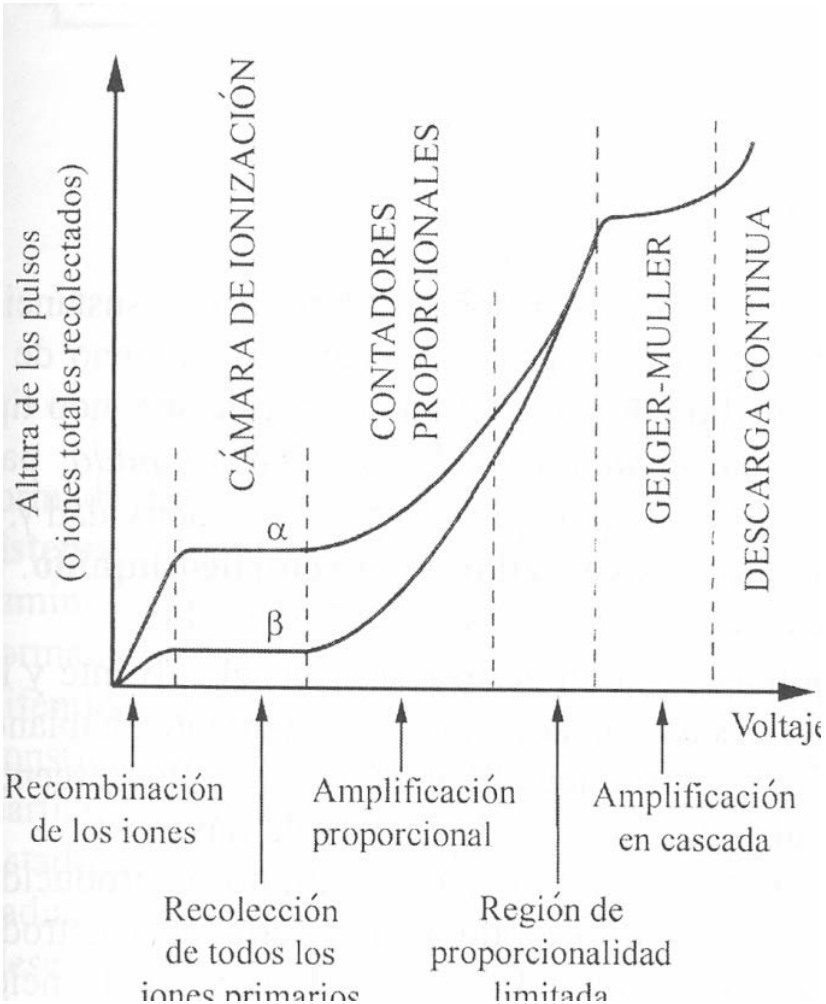
(a): <u>exceso de neutrones</u> (el mas frecuente en isotopos de interés biológico)
Emitir β^- (negatrón) y con ello ganar un protón.
${}_{6}C^{14} \rightarrow \beta^{-1} + {}_{7}N^{14}$; ${}_{1}H^{3} \rightarrow \beta^{-1} + {}_{2}He^{3}$

-Situación (b): exceso de protones (generalmente isotopos “artificiales”). Emitir un β^+ (positrón) y ganar un neutrón.
${}_{11}Na^{22} \rightarrow \beta^{+1} + {}_{10}Ne^{22}$

Isótopos radioactivos

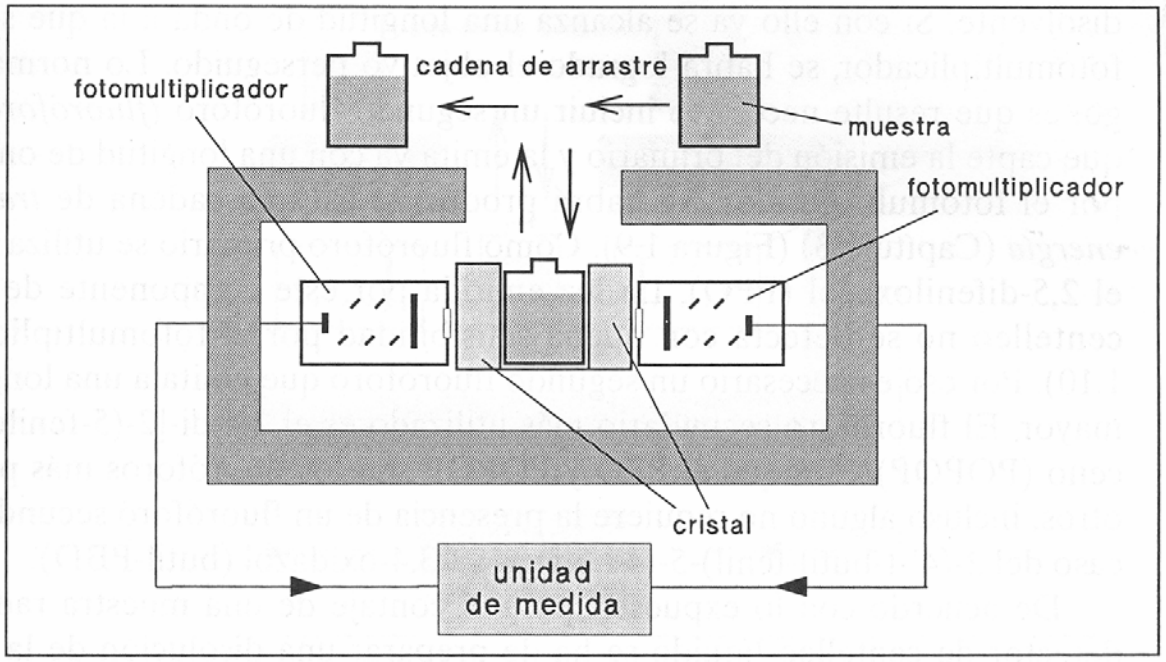
Modos de interacción con la materia: Ionización.
Detección por producción de pares iónicos.





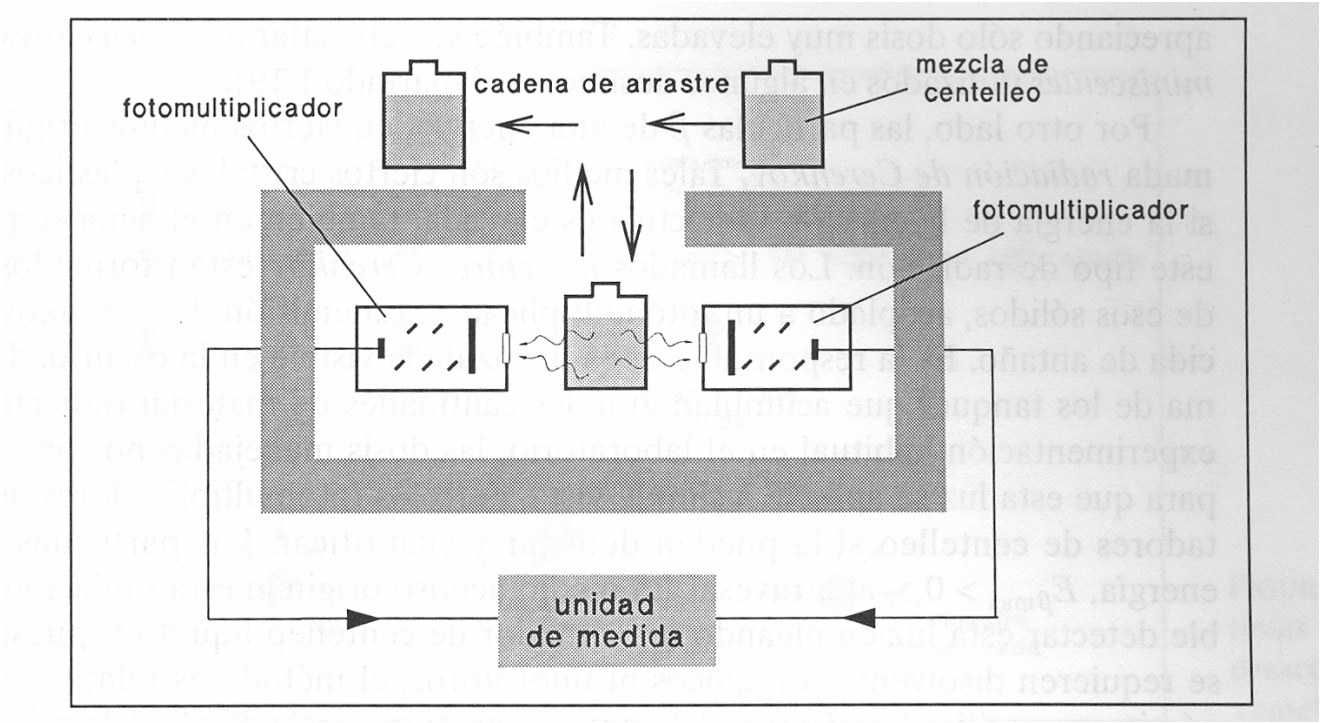
Isótopos radioactivos

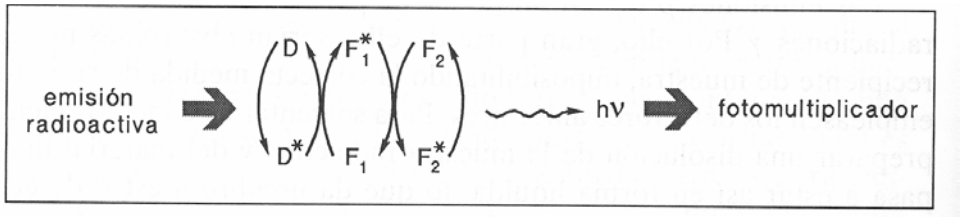
Modos de interacción con la materia: Excitación.
-Detección por excitación de un fluoróforo y medida de la fluorescencia emitida.
-Centelleo sólido. Mas adecuado para emisores γ.



Isótopos radioactivos

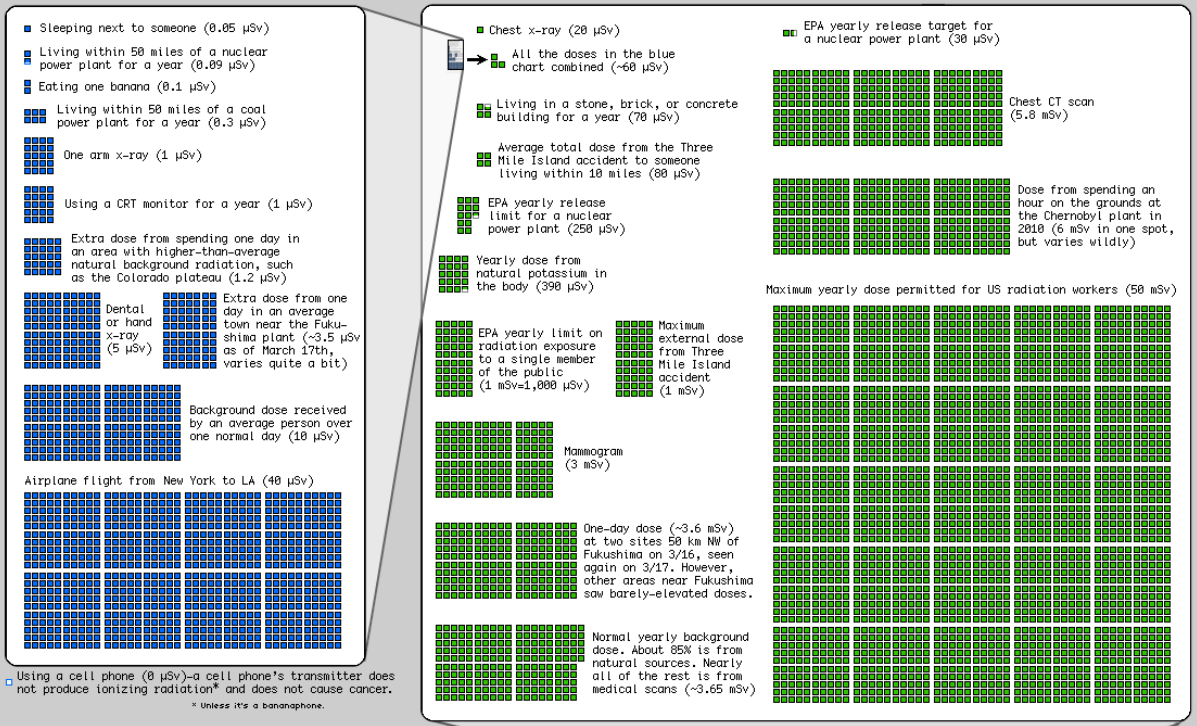
Modos de interacción con la materia: Excitación.
-Detección por excitación de un fluoroforo y medida de la fluorescencia emitida.
-Centelleo líquido. Mas adecuado para emisores β.





Radiation Dose Chart

This is a chart of the ionizing radiation dose a person can absorb from various sources. The unit for absorbed dose is "sievert" (Sv), and measures the effect a dose of radiation will have on the cells of the body. One sievert (all at once) will make you sick, and too many more will kill you, but we safely absorb small amounts of natural radiation daily.
Note: The same number of sieverts absorbed in a shorter time will generally cause more damage, but your cumulative long-term dose plays a big role in things like cancer risk.



Sources:

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Chart by Randall Munroe, with help from Ellen, Senior Reactor Operator at the Reed Research Reactor, who suggested the idea and provided a lot of the sources. I'm sure I've added in lots of mistakes; it's for general education only. If you're basing radiation safety procedures on an internet PNG image and things go wrong, you have no one to blame but yourself.