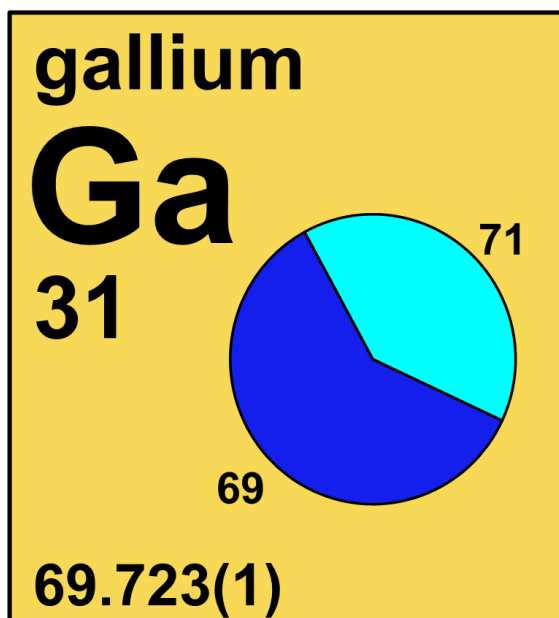
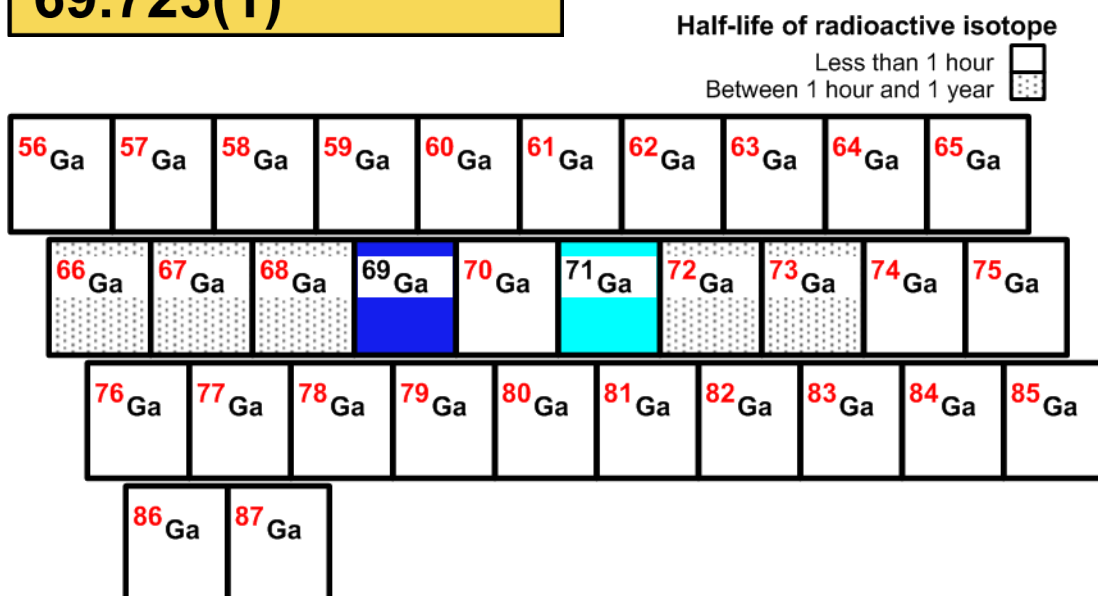


## 4.31 gallium



Stable isotope	Relative atomic mass	Mole fraction
$^{69}\text{Ga}$	68.925 574	0.601 08
$^{71}\text{Ga}$	70.924 703	0.398 92



## 4.31.1 Gallium isotopes in medicine

$^{68}\text{Ga}$  (with a **half-life** of 68 minutes) is a **radioactive isotope** that emits **positrons**, which are used to produce high-resolution imaging with **positron emission tomography (PET)**. Unlike  $^{18}\text{F}$ , which is most commonly used,  $^{68}\text{Ga}$  is more easily produced using a cost-effective generator with the **parent radionuclide**  $^{68}\text{Ge}$  (with a half-life of 271 days) (Figure 4.31.1). Once produced,  $^{68}\text{Ga}$  easily couples to biomolecules (most commonly **peptides**) that target **G-protein coupled receptors**, which are **over-expressed** on human tumor cells. The labeled protein acts as a **radiotracer** for cancer diagnostics. PET images are often coupled with CT images to get a more

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complete picture of the body [253-259]. **Radiopharmaceutical**  $^{67}\text{Ga}$  (with a half-life of 78 hours) is a gamma-emitting **isotope** used in **scintigraphy** for medical imaging [260-262].



**Fig. 4.31.1:** Gallium-68 generator used to provide medical therapy with the **positron**-emitting **radionuclide**  $^{68}\text{Ga}$ . The **parent radionuclide**,  $^{68}\text{Ge}$ , has a **half-life** of 271 days and has been used as the source of  $^{68}\text{Ga}$ , which has a half-life of only 68 minutes. Image kindly provided by Dr. Anatolii Razbash, Cyclotron Co. Ltd., Obninsk, Russia.