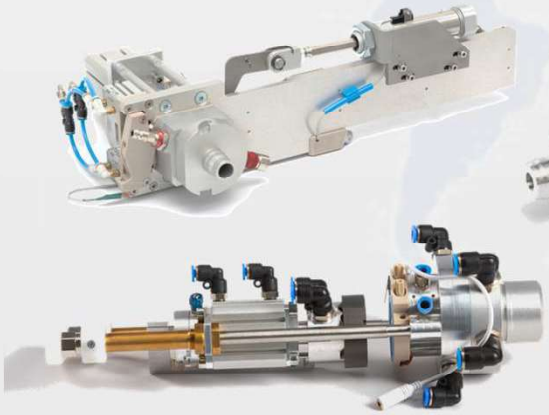
d.o.t.s. Target system for ^{68}Ga production
(dissolution on the spot)

Overview

The increasing demand for ^{68}Ga motivated the development of cyclotron production methods. Liquid targets offer simple installation and lower investment. The workflow is similar to the fluorine production, but yields are low. Solid target systems are capable of producing much higher activity but are more complicated to install and to operate.

SynIQ Ltd has developed a d.o.t.s. Target to combine the benefits of solid- and liquid targets. The d.o.t.s. Target operates with disposable preloaded solid target holders, tested up to 50 microampere beam current. After irradiation, the target material is automatically dissolved in the target system and transferred to a hotcell via PEEK capillary. Installation is simple, operation is controlled by a PLC.

	Liquid target	Solid target	d.o.t.s. target
simple installation	●	●	●
low cost	●	●	●
high yield	●	●	●
safe operation	●	●	●





- irradiation of solid ^{68}Zn on a medical cyclotron
- in-target dissolution of target material
- transfer of produced activity via capillary lines
- multi-shot target holder with four or seven positions (depending on cyclotron-type)

Workflow

Process	Description	Time
load	load the target magazine into the target system	1 min.
prepare	pressure test cooling chamber	1 min.
irradiate	cool the target with the cooling system of the cyclotron	variable
dissolve	• dry out cooling chamber with pressurized air • shift target holder to the dissolution position • pressure test dissolution chamber and dissolve target material • rinse and dry transfer lines	15-20 min.

Produced ^{68}Ga activity at EOB (GBq)

	Irradiation time	Beam current	^{68}Zn amount	Activity EOB
GE PETtrace	120 min	50 µA	80 mg	109.3 GBq
GE miniTrace	60 min	30 µA	40 mg	27.0 GBq
IBA Cyclone	173 min	65 µA	40 mg	100.3 GBq
IBA KIUBE	120 min	50 µA	40 mg	68.2 GBq



Quality parameter	Ph.EUR. requirement	d.o.t.s. Target result
Identification by gamma spectrometry	Peak at 0.511 MeV	Confirmed
Appearance	Clear and colorless	Confirmed
$t_{1/2}$	62.0 – 74.0 min	67.9 ± 0.2 min
pH	<2	<2
Iron content	<10.00 µg/GBq	**0.02 ± 0.01 µg/GBq**
Zinc content	<10.00 µg/GBq	**0.06 ± 0.03 µg/GBq**
Radionuclidic purity	> 98.00 %	**99.97 ± 0.01 %**
Ga-66/67 content	< 2.00 %	**0.03 ± 0.01 %**
Other radionuclidic impurities	< 0.1 %	Not detected
TLC	> 95.0 % $^{68}Ga^{3+}$	**99.9 ± 0.1 %**
Volume	-	5 ml
HCl concentration	> 0.01 M	0.1 M

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