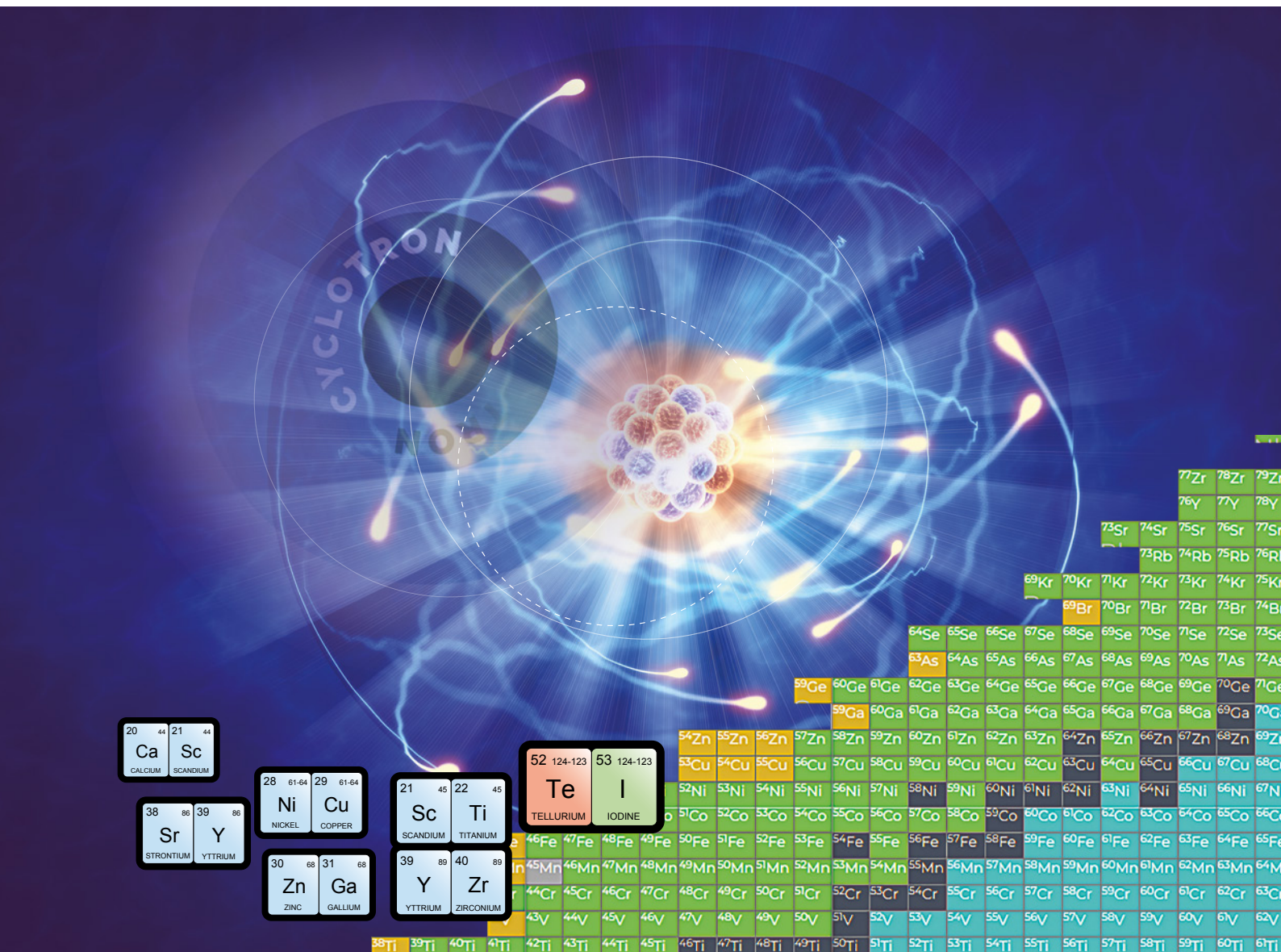


ALCEO 4.0

SOLID TARGET PROCESSING SYSTEM FOR
RADIONUCLIDES PRODUCTION



ALL IN ONE | UP TO SEVEN ISOTOPES



Simple
installation



Operator
safety



Easy to
use



Fully
automated



Fast
changeover



RADIOPHARMA



COMECER

an  company

ALCEO 4.0

SOLID TARGET PROCESSING SYSTEM

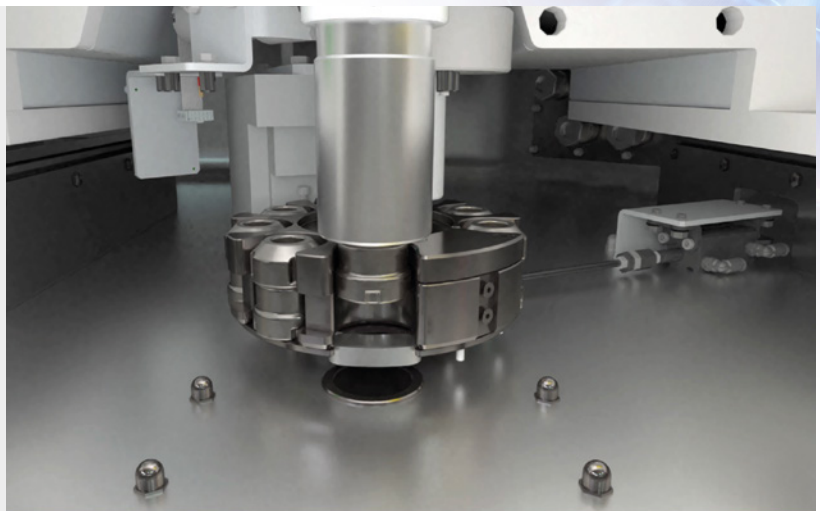
ALCEO is a fully automated system for the production of radionuclides used in radiopharma. The radionuclides produced are available in a form suitable for radiopharmaceutical synthesis. The integrated system allows all the operations to be carried out without the manual intervention of operators.

NEW FEATURES

- UP TO 7 ISOTOPES WITH SINGLE SYSTEM
- FULLY AUTOMATED PROCESS
- MORE SAFETY FOR THE OPERATOR
- INTEGRATED DEGRADER FOIL IN THE SHUTTLE
- ONLY ONE TARGET FOR ALL ISOTOPES

Integrated shielded rotating storage for shuttles

- Fully automated process
- Eight shuttle compartments available
- Integrated shielding allows hot shuttle storage
- Significant reduction of operator radiation exposure



New Shuttle

- Universal shuttle for electroplating, powder chemistry or commercial foil.
- Integrated degrader foil.
- Different caps for different beam energies.



New Isotopes

- From today, with the new Alceo, it is possible to produce four new isotopes.
- Seven different dissolution stations for seven different isotopes.

Current use

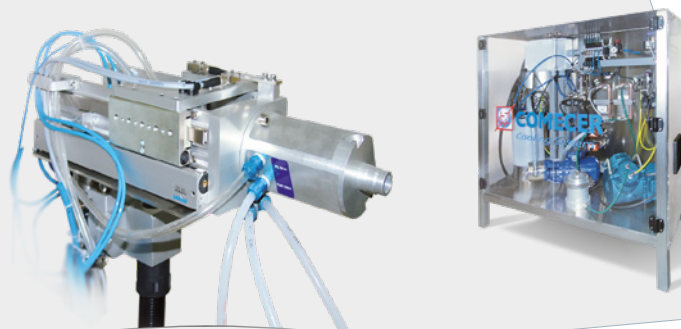


New Isotope

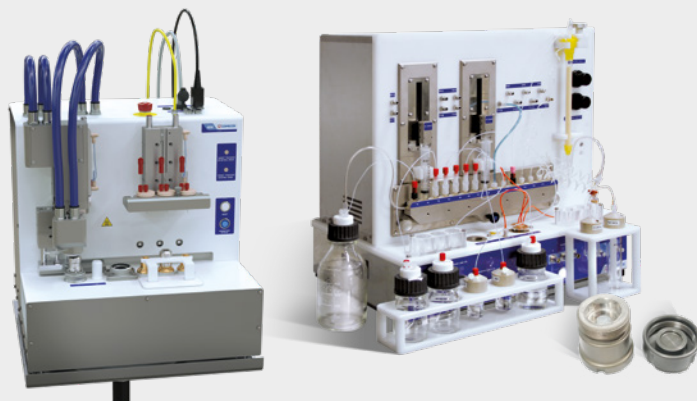


CYCLOTRON

IRRADIATION UNIT & COOLING SYSTEM



ALCEO METAL FOR ^{89}Zr ^{61}Cu ^{64}Cu ^{68}Ga ^{44}Sc ^{86}Y ^{45}Ti PRODUCTION



20 Ca CALCIUM	44 Sc SCANDIUM	28 61-64 Ni NICKEL	29 61-64 Cu COPPER	21 45 Sc SCANDIUM	22 45 Ti TITANIUM
38 86 Sr STRONTIUM	39 86 Y YTTRIUM	30 68 Zn ZINC	31 68 Ga GALLIUM	39 89 Y YTTRIUM	40 89 Zr ZIRCONIUM

ALCEO HALOGEN FOR ^{123}I AND ^{124}I PRODUCTION



52 124-123 Te TELLURIUM	53 124-123 I IODINE
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ALCEO 4.0

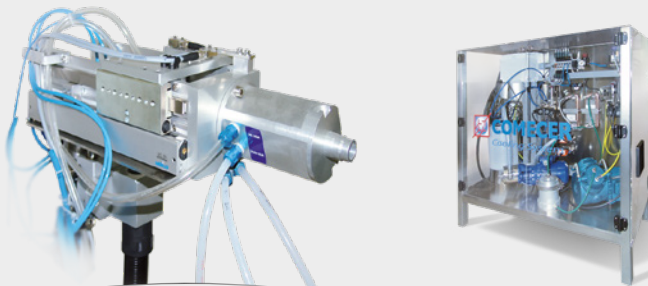
SOLID TARGET PROCESSING SYSTEM

ALCEO METAL FOR ⁸⁹Zr, ⁶¹Cu, ⁶⁴Cu, ⁶⁸Ga, ⁴⁴Sc, ⁸⁶Y, ⁴⁵Ti PRODUCTION

EXTERNAL PLATING / POWDER COMPRESSING STATION & TARGET SHUTTLE



IRRADIATION UNIT & COOLING SYSTEM



EDS 4.0 & TADDEO-PRF FOR ⁸⁹Zr ⁶¹Cu ⁶⁴Cu ⁶⁸Ga ⁴⁴Sc ⁸⁶Y ⁴⁵Ti PRODUCTION



2044 Ca CALCIUM	2144 Sc SCANDIUM	2861-642961-64 Ni NICKEL	2961-64 Cu COPPER	21452245 Sc SCANDIUM	2245 Ti TITANIUM
3886 Sr STRONTIUM	3986 Y YTTTRIUM	30683168 Zn ZINC	3168 Ga GALLIUM	39894089 Y YTTTRIUM	4089 Zr ZIRCONIUM

ALCEO METAL General Description

It allows the irradiation of a Nickel/Zinc galvanic deposit $^{64}\text{Ni}/^{68}\text{Zn}$ aimed at obtaining radionuclide $^{64-61}\text{Cu}/^{68}\text{Ga}$.

It consists of two modules for the production of both $^{64-61}\text{Cu}/^{68}\text{Ga}$ and one single PTS.

It allows also the irradiation of a sheet of natural Yttrium ^{89}Y and Scandium ^{45}Sc aimed at obtaining radionuclide ^{89}Zr . It consists of two modules for the production of ^{89}Zr and one single PTS.

From today, it's possible also to work with salts: Alceo allows the irradiation of compressed calcium/Strontium carbonate powder ($^{44}\text{Ca}/^{86}\text{Sr}$) aimed at obtaining radionuclide ^{44}Sc & ^{86}Y .

External plating & Powder compressing station

The EXTERNAL PLATING is an independent module of the Alceo Metal system that permits the electro-deposition of isotopes in a separate area. It can perform the following operations automatically deposit of the nickel/zinc to be irradiated inside the target shuttle.

The POWDER COMPRESSING STATION is an independent module of the Alceo Metal system that permits the compressing of salt in a separate area. It can perform the following operations: making the pellet of the calcium/strontium carbonate to be irradiated inside the target shuttle.

Target shuttle Metal

The Alceo target shuttle allows the automatic positioning of the target (deposition, foil or compressed powder) in front of the cyclotron beam. Once the shuttle has been positioned on the PTS, the target can be bombarded. The shuttle is equipped by a spacial cup which is functioning has integrated degraded foil.

Technical data

PTS module: irradiation unit

Structure	Aluminium Stainless steel AISI 316L
Total weight	10 kg
External dimensions	467.5 x 166 x 222 mm (w x d x h)

EDS module

Structure material	POM
Total weight	Revolver shielding: 107 kg Revolver + EDS support: 42 kg EDS module: 50 kg
External dimensions	510 x 503 x 662 mm (w x d x h)

PTS - Irradiation unit and Cooling System

The irradiation unit is directly connected to the cyclotron and guarantees the correct positioning of the target in front of the beam port. Target positioning is fully automated. The unit is connected to its own "water and helium cooling system". The cooling system is connected to the cyclotron cold water and helium circuit, as a normal liquid target.

EDS – Dissolution/Transfer/Storage module

It can be placed inside a hot cell which is connected to the cyclotron by the flexible tube for the target transfer. It is a pneumatic system that carries out automatically the following operations:

- automatic shuttle transfer between the hot cell and the cyclotron
- automatic removing of the shuttle's integrated degrader foil (cap)
- dissolution of the irradiated isotope
- storage of target shuttles through the integrated rotating station.

Dissolution processes are performed by separated capillaries circuits to avoid any kind of cross contamination. Inside the hot cell, 7 different dissolution head will be placed, in order to perform the production of all the isotopes without cross-contamination.

TADDEO-PRF - Purification Module

It can be placed inside a hot cell and must be connected to the EDS module by capillary lines. TADDEO-PRF module contains the necessary components for the purification by Ion Chromatography of the produced isotope ($^{64-61}\text{Cu}/^{68}\text{Ga}/^{89}\text{Zr}/^{45}\text{Ti}/^{44}\text{Sc}/^{86}\text{Sr}$ and even more). The module is disposable cassette based.

Cooling system

Structure	Steel
Total weight	100 kg
External dimensions	1090 x 543 x 1057 mm (w x d x h)
Tank capacity	10 l

External Plating

Structure material	POM
Total weight	30 kg
External dimensions	512 x 344 x 490 mm (w x d x h)

TADDEO-PRF

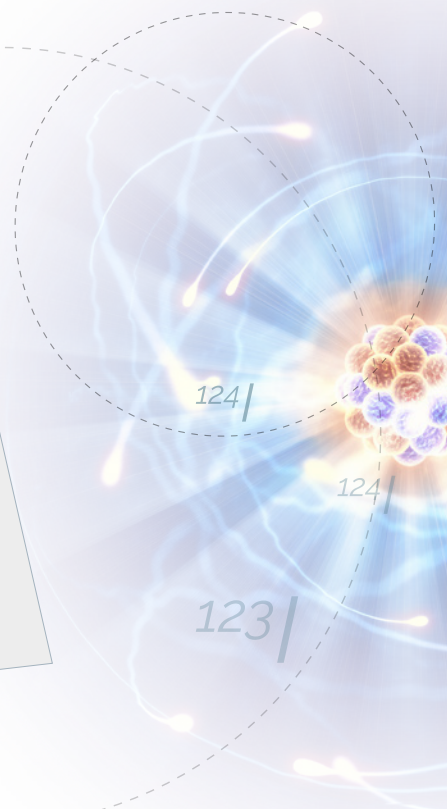
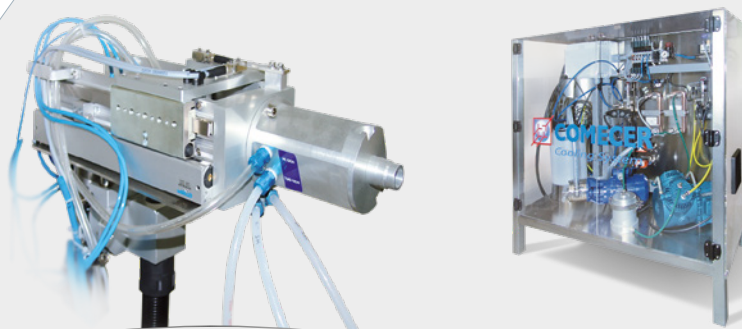
Structure material	POM
Total weight	33 kg
External dimensions	530 x 375 x 550 (w x d x h)

ALCEO 4.0

SOLID TARGET PROCESSING SYSTEM

ALCEO HALOGEN FOR ^{123}I AND ^{124}I PRODUCTION

IRRADIATION UNIT & COOLING SYSTEM



EVP FOR ^{123}I AND ^{124}I PRODUCTION



52 $^{124-123}$	53 $^{124-123}$
Te	I
TELLURIUM	IODINE

ALCEO HALOGEN General Description

It allows the irradiation of a Tellurium oxide deposit ^{124}Te and ^{123}Te aiming at obtaining the equivalent radionuclide ^{124}I and ^{123}I . It consists of a module for the production of ^{124}I and ^{123}I (mixed process) (mixed process) and one single PTS.

Target shuttle Halogen

The Alceo Halogen target shuttle allows the automatic positioning of the deposit in front of the cyclotron beam. Once the shuttle has been positioned on the PTS, the target can be bombarded.

PTS - Irradiation unit and Cooling System

The irradiation unit is directly connected to the cyclotron and guarantees the correct positioning of the target in front of the beam port. Target positioning is fully automated. The unit is connected to its own "water and helium cooling system". The cooling system is connected to the cyclotron cold water and helium circuit, as a normal liquid target.

Technical data

PTS module: irradiation unit

Structure	Aluminium Stainless steel AISI 316L
Total weight	10 kg
External dimensions	467,5 x 166 x 222 mm (w x d x h)

Cooling system

Structure	Steel
Total weight	100 kg
External dimensions	1090 x 543 x 1057 mm (w x d x h)
Tank capacity	10 l

EVP – Iodine Evaporation/Purification unit

The unit can be placed inside a hot cell and must be connected to the PTS unit with the target transfer tube. The EVP module contains the necessary components for the following operations:

- automatic transfer of the target shuttles between the hot cell and the cyclotron
- plating of the target (tellurium dioxide) on the target shuttle
- evaporation of the iodine radioisotope from the irradiated target.

The purification task makes use of a "disposable cassette", in order to avoid the module contamination and to guarantee the product sterility. Comecer supplies the sterile cassette, while the preparation of the required synthesis reagents is the customer's responsibility.

EVP module

Structure material	Aluminium
Total weight	44 kg
External dimensions	550 x 380 x 615 mm (w x d x h)



Scientific References

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COMECER S.p.A. - Via Maestri del Lavoro, 90
48014 - Castel Bolognese (RA) - Italy
t: +39 0546 656375 - f: +39 0546 656353
comecer@comecer.com - www.comecer.com



www.comecer.com/alceo