Cyclone® 18/9
Moving Ahead, delivering More
The Cyclone® 18/9 has met our Centre’s expectations as a reliable and a stable machine, producing ample radioisotopes for our existing customers. Importantly, the Cyclone® 18/9 has sufficient capacity and flexibility to continue to meet increased isotope demand for the foreseeable future, strengthening our position as the number one supplier in our region.

The user friendliness of the IBA operational system has enabled us to establish a broad team of skilled operators to ensure that the facility remains operational, even at times when the availability of some of our staff is reduced, which occurs in busy hospitals.

The personal response and follow-up from individual IBA staff has greatly assisted our Centre’s technical understanding and problem solving capabilities for the Cyclone® 18/9, which is demonstrated by our Centre’s up-time and isotope delivery rates.

We have no hesitation in recommending IBA as a partner for PET radioisotope production.”

Thomas Tuchyna
Cyclotron Manager
Sir Charles Gairdner Hospital, Perth, Australia

What is your greatest potential?

- To maximize your production capacity, while protecting your team?
- To stay ahead by producing an expanded line of radioisotopes?
- To complete your project on time?

What if you could find a partner to help you maximize your greatest potential?

Wouldn’t your choice be simple?
The IBA Molecular Cyclone® 18/9 maximizes your potential.

**Enhance**

More capacity, better safety

Selecting a cyclotron is a long-term decision that will affect your production capacity, thus your profitability.

The Cyclone® 18/9 offers the most vital success factors.

**Operational and cost efficiency**

- High energy: 18 MeV protons
- High current: up to 150 μA
- High yield targets: up to 15 Ci $^{18}$F

**Safety and comfort**

- Low exposure with distributed targets around the cyclotron
- Quick disconnect targets for easy maintenance
- Redundant and instant exchange of foil extraction system
- Long-life ion source
- Extra-stable dual beam mode using harmonic coils

**Discover**

A new world of research

IBA Molecular has used its expertise to create the features of the Cyclone® 18/9 to give you access to the widest range of PET radiotracers.

**A full range of target technology**

- Eight targets for more flexibility
- Standard deuteron beam for production of $^{15}$O, $^{18}$F$_2$ radioisotopes
- Nirta® Solid target technology for novel radioisotopes: $^{114}$I, $^{64}$Cu, ...

**External beam line for research**

- Available in various configurations
- Enhance research opportunities by use of own customised target system
- Ideal educational tools (fundamental physics, ...).

**Become exclusive research partner**

- You will be afforded the unique opportunity to participate in a worldwide collaborative network that is focused on the future of molecular imaging.

**Integrate**

More expertise

Turn your most advanced project into reality by employing the IBA global solution for a turnkey cyclotron facility and expertise in full pharmaceutical engineering.

**Global solution**

- Facility and Process equipment
- Radiation safety calculations
- cGMP validation
- Financing solutions
- Training programs

The Cyclone® 18/9 -ST (STandard) is built with an upgrade-ready configuration to offer a painless and cost-effective upgrade to the Cyclone® 18/9 -HC (High Current) model at a later stage, if required.
Typical Production Yields - PET Isotopes

<table>
<thead>
<tr>
<th>Isotope</th>
<th>Chemical Form</th>
<th>Target Reaction</th>
<th>Target Material</th>
<th>Target Size</th>
<th>Irradiation Time (min)</th>
<th>Recovered Activity (EOB) (mCi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$^{11}$C</td>
<td>CO$_2$</td>
<td>$^{14}$N(p,α)$^{11}$C</td>
<td>$N_2$ + 0.5-1% O$_2$</td>
<td>30</td>
<td>3 000</td>
<td></td>
</tr>
<tr>
<td>$^{15}$N</td>
<td>NH$_3$</td>
<td>$^{14}$N(p,α)$^{15}$N</td>
<td>$H_2O$ (natural) $+$ 5 mMol Ethanol</td>
<td>15</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>$^{18}$O</td>
<td>O$_2$</td>
<td>$^{16}$O(p,α)$^{18}$O</td>
<td>$N_2$ + 0.5% O$_2$</td>
<td>on line</td>
<td>500 mCi/min (cont. flow)</td>
<td></td>
</tr>
<tr>
<td>$^{18}$F</td>
<td>F$^-$</td>
<td>$^{18}$O$_2$(p,n)$^{18}$F</td>
<td>$F^-$</td>
<td>60</td>
<td>1 000</td>
<td></td>
</tr>
<tr>
<td>$^{124}$I</td>
<td>NaI</td>
<td>$^{124}$Te(p,n)$^{124}$I</td>
<td>2</td>
<td>100 µA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$^{64}$Cu</td>
<td>CuCl</td>
<td>$^{64}$Ni(p,n)$^{64}$Cu</td>
<td>2</td>
<td>100 µA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reliability

- 2 separate internal P.I.G. ion sources
- Eight independent dual stripper extraction system
- Extra-stable dual beam
- Powerful and efficient RF amplifier

Target Flexibility

- Number of target ports: 8
- Simultaneous extracted beams: 2
- Nirta™ Fluor Target: large range of volumes: 2 to 6 m
- Vecito® Beam Transport Line: 8
- Nirta® Solid Target: 2 to 6 m
- Vectio® Beam Transport Line: 8

Low power consumption

- Standby mode: < 6 kW
- Beam-on mode: < 45 kW
- < 50 kW

Deep valley magnet

- Coils D.C. power: < 15 kW
- Mean field: 1.35 Tesla
- Exclusive international patent

Compact design

- Total weight: 25 Tons
- Overall dimensions (dia. x height): 2 x 2.2 m
- Minimal building opening: 2.4 x 2.4 m
- Minimal vault dimensions: 4 x 4 x 3 m

Minimal exposure

- Minimal activation with horizontal accelerating plane
- Non-clustered targets, naturally shielded by the yoke
- Local target shielding doors (optional) for easier building decommissioning

(1) All values given in single beam mode
(2) Only available on Cyclone® 18/9 -HC.
(3) Penning Ion Gauge Technology
(4) International patent number: WO 2004/049770 A1
(5) International patent numbers EP 0 222 786 and US 4,771,208
IBA activities in a nutshell

IBA delivers solutions of unprecedented precision in the fields of cancer diagnosis and therapy. The company also offers sterilization and ionization solutions to improve the hygiene and safety of everyday life.

**Diagnosis**

IBA has unique expertise in the design of cyclotrons and in the production and distribution of radiopharmaceutical tracers which are used every day in hospitals to quickly and accurately detect cancer, neurological and cardiac diseases. IBA also offers dosimetry products used in many hospitals for quality assurance in X-Ray diagnosis and for patient-dose monitoring.

**Therapy**

IBA has developed Radiotherapy solutions and dosimetry equipment to treat cancer with the greatest accuracy. IBA is the undisputed leader in Particle Therapy, acknowledged to be the most precise and effective clinical radiotherapy method in the selective destruction of cancer cells.

**Sterilization & Ionization**

IBA designs electron accelerators and high power X-Ray solutions used in many industries to sterilize medical devices, to cold pasteurize food products and to improve polymer properties. Over 250 IBA Industrial accelerators are used in the world today, some for more than 40 years.

IBA, a Belgian company, is listed on the paneuropean stock exchange EURONEXT and its Annual Reports can be downloaded on the Website: www.iba-worldwide.com.