

## Synthra Fusionplus (Catalog No. 003r)

Synthra Fusionplus is a flexible and completely automated radiosynthesizer for the efficient production of [ $^{18}\text{F}$ ]labeled and [ $^{11}\text{C}$ ]labeled compounds based on the generation of gas-phase production of [ $^{11}\text{C}$ ]methyl iodide and [ $^{11}\text{C}$ ]methyl triflate. It is specially designed to perform the required multi-step synthesis e. g. for using [ $^{11}\text{C}$ ]propylation. Automating the synthesis is simple, with the easy-to-use configuration software SynthraView. The Synthra Fusionplus module offers both fully automatic and manual modes of operation.

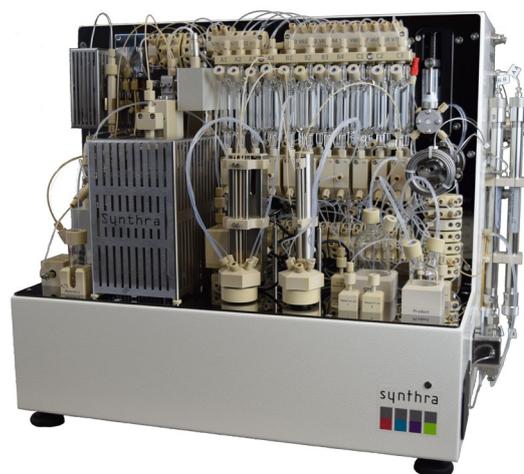
### Gas Phase Capabilities

- ✓ High specific activities are achieved from in-target produced [ $^{11}\text{C}$ ]CO<sub>2</sub> ranging from 5 Ci/ $\mu\text{mol}$  to 20 Ci/ $\mu\text{mol}$  (Higher specific activities are possible when using methane target).

The [ $^{11}\text{C}$ ]CO<sub>2</sub> produced in target is quantitatively trapped in the stainless steel capillary tubing at -180 °C. Subsequently, the [ $^{11}\text{C}$ ]CO<sub>2</sub> is released into the methane oven where it is converted to [ $^{11}\text{C}$ ]CH<sub>4</sub> by reduction on a Ni-catalyst. The [ $^{11}\text{C}$ ]CH<sub>4</sub> is trapped at -120 °C on Carboxen®. In a successive gas phase reaction the iodination of [ $^{11}\text{C}$ ]CH<sub>4</sub> to [ $^{11}\text{C}$ ]MeI is carried out in a gas phase recirculation system with gaseous I<sub>2</sub> at 730 °C. During circulation [ $^{11}\text{C}$ ]MeI accumulates on a Porapak™ column. Finally, it is released at 200°C and ready for any kind of labeling reaction.

### [ $^{11}\text{C}$ ] Labeling Possibilities

- **[ $^{11}\text{C}$ ]Methyl iodide production:** [ $^{11}\text{C}$ ]MeI is ready for release 7 minutes after trapping the [ $^{11}\text{C}$ ]CO<sub>2</sub>. The yield for the [ $^{11}\text{C}$ ]methyl iodide formation is under good conditions above 50 % non-decay corrected (ndc).
  - Up to 10 sequential methyl iodide preparations are possible from a single box set-up.
- ✓ **Methyl triflate production:** The [ $^{11}\text{C}$ ]MeI can be converted to [ $^{11}\text{C}$ ]MeOTf by passing through a silver triflate filled column at 180 °C. The possible conversion yield from methyl iodide is 95 %.
  - Both [ $^{11}\text{C}$ ]MeI and [ $^{11}\text{C}$ ]MeOTf can be used for solid support heterogeneous reactions (e. g. [ $^{11}\text{C}$ ]choline, [ $^{11}\text{C}$ ]methionine) or can be released into the reaction vessel for homogeneous reactions.
- ✓ **Acetate production:** The purified [ $^{11}\text{C}$ ]CO<sub>2</sub> is passed into the reaction vessel for Grignard reactions.



### [ $^{18}\text{F}$ ] Labeling Possibilities

- ✓ Synthesis of [ $^{18}\text{F}$ ]-labeled compounds like FDG, FLT, FHBG, FDDNP, MISO, FAZA and Fluorocholine
- ✓ Simple creation of user-defined synthesis methods
- ✓ Uses a dedicated sub system for the **recovery and collection of [ $^{18}\text{O}$ ]H<sub>2</sub>O**.

### General Features

- ✓ **Heating and cooling capabilities**
  - Nine heating zones
  - Six with cooling capabilities
  - Temperature range: -196 °C – 950 °C
- ✓ **Detectors and controllers**
  - Six shielded radiation detectors
  - Three electronic flow controllers (HCN or CO option: Four flow controllers)
  - Four Pressure sensors
- ✓ **Dispensers and valves**
  - HR-dispenser (up to 24.000 steps, 5 mL)

# Synthra C-11 Family

## Product Description and Technical Specifications

synthra



- HPLC pneumatic injection valve (1.5 mL to 5 mL sample loop)
- Two spare valves for customization
- Chemically inert valves with small dead volume < 25 µL, 5 bar rated

### ✓ Self-Cleaning System

✓ **Dimensions** (w x d x h): 55 × 50 × 48 cm

✓ **Weight:** approx. 41 kg

## Synthesis Features

✓ **Two closed reaction vessels** (-196 °C – 200 °C) with integrated cooling to reduce synthesis time

- 3 mL glass reaction vessel (min. volume: 50 µL), glassy carbon on request
- 11 mL glassy carbon reaction vessel

✓ **Triflate/column oven** (RT – 200 °C)

✓ **Eleven reagent vials**

- Seven small (1 – 3 mL) and four large (10 - 15 mL) volume glass vials for reagents

✓ **Five additional cartridge holders**

✓ **Built-in preparative radio/UV-HPLC system** for in-process purification and final product collection (max flow: 40 mL/min)

- Variable wavelength detector with a range from 190 nm to 800 nm
- Quaternary gradient
- Two HPLC semi-preparative column

✓ **SPE unit** for final product formulation

## Additional Synthesis Options

→ **[<sup>11</sup>C]CO option** (Catalog No. 003co): After purification, the [<sup>11</sup>C]CO<sub>2</sub> is released into the column oven for Zn- or Mo-catalyzed reduction to [<sup>11</sup>C]CO.

→ **[<sup>11</sup>C]HCN option** (Catalog No. 003hcn): The [<sup>11</sup>C]CH<sub>4</sub> is released with NH<sub>3</sub> gas into a high temperature area where it undergoes a Pt-catalyzed conversion into [<sup>11</sup>C]HCN at 950 °C.

→ **[<sup>11</sup>C]HCN/CO option** (Catalog No. 003hcnco): This option combines all features of the HCN and the CO option

→ **Loop option** (Catalog No. 003lo): A heatable and coolable reaction loop is integrated in the synthesis route to reduce synthesis time.

→ **Product solvent evaporator** (Catalog No. 000pse)

## GMP Features

✓ Synthesis files for several [<sup>11</sup>C]radiotracers available

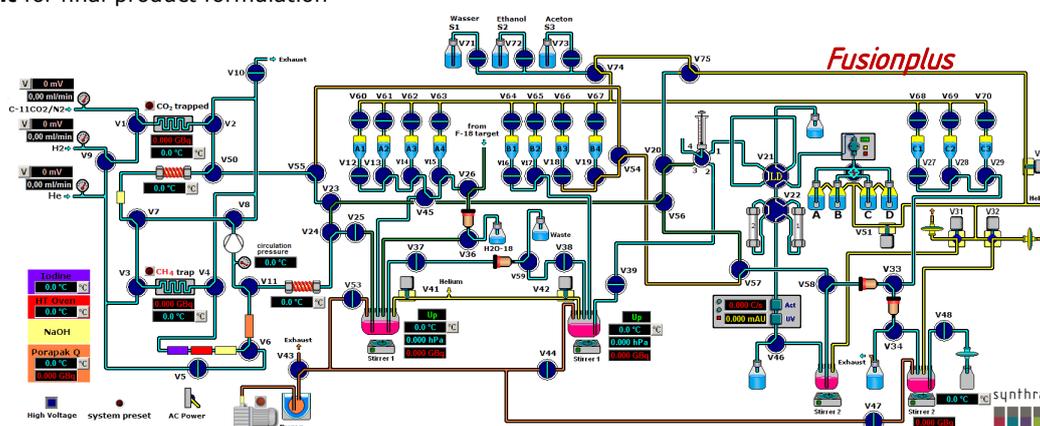
✓ **GMP compliant.** Electronic control and data collection (27/18 channels)

✓ **21CFRpart11** & **LIMS** compatible

## Terminal Control

✓ A laptop (Win 11 Pro) with preinstalled controlling software SynthraView is included

✓ Four digital inputs for communication with external devices upon request



The Graphical User Interface (GUI) of the SynthraView software. The diagram shows the standard configuration. Modifications may be necessary depending on the tracer to be synthesized.

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