

## Radioactive solutions

### • Handling precautions

It is strongly advisable to wear overalls and protective gloves.

When diluting a solution, the diluent used must have the same chemical composition and the same concentration of non-radioactive material as the standard solution.

When preparing a source, it must be ensured that volatile components are not lost during handling.

Working surfaces should be subject to radiation protection checks after use.

### • Volumes

The standardized volumes (1, 5, and 20 cm<sup>3</sup>) shown in the tables are determined with an uncertainty of 0,2 % (k = 2).

The volumes 50 and 500 cm<sup>3</sup> are given as indicative values, but the masses of solution are nevertheless certified to within 0,2 % (k = 2).

### • Density

Density is generally very close to 1 g.cm<sup>-3</sup> and is stated on the calibration certificate.

### • Available packaging

- Radioactive standard solutions are usually supplied in sealed [glass ampoules](#).
- High-activity solutions are supplied in [capped vials](#) for ease of handling.
- Packaging is designed to [prevent evaporation](#) during transport and storage.
- Large-volume solutions for environmental measurements are supplied in [plastic vials](#).
- Certain solution are supplied in [V-vial](#).

### • Medium of dilution

Medium of dilution is shown in the tables as an indicative value only and is subject to change without notice. The chemical composition shown on the calibration certificate must be complied with in case of dilution by the end user.

### • Measured values variable

Standard solutions are characterized in terms of specific activity, expressed in kBq.g<sup>-1</sup>.

The stated activity applies to the main radionuclide, and excludes decay products and identified impurities. The available nominal specific activities are defined for each radionuclide in the solution tables.

Other radionuclides and different activity levels can be supplied on request.

### • Storage shieldings and transportation packages

Standard solutions must be stored in their original packages or in suitable containers for radiation protection purposes.

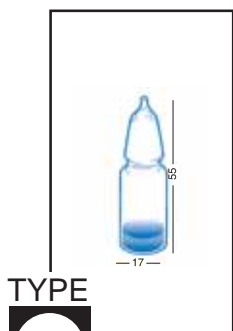
CERCA LEA products are supplied with transportation packages which comply with national and international standards (see Informations in the first chapter of this catalogue).

## • Made-to-measure solutions upon request

| Activity on request                 |   | Package on request                  |                             | Nominal solution (±15%)             |  |
|-------------------------------------|---|-------------------------------------|-----------------------------|-------------------------------------|--|
| Radionuclide                        | Type of vial (Package B)                      | Radionuclide                        | Type of vial (non-standard) | Radionuclide                        | Type of vial (Package B)                     |
| <b>CS137EL</b>                      | <b>SB30KBQ</b>                                | <b>CS137EL</b>                      | <b>HS30KBQ</b>              | <b>CS137TL</b>                      | <b>SB37MBQ</b>                               |
| Type of product (Solution standard) | Total requested activity in 5 cm <sup>3</sup> | Type of product (Solution standard) | Total requested activity    | Nominal solution with value at ±15% | Approximate requested total activity (37MBq) |

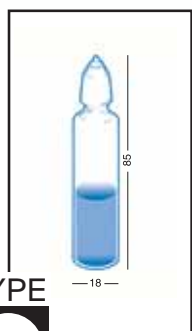
For <sup>133</sup>Ba and <sup>152</sup>Eu sources and 9ML01 multigamma mixtures, see also spectrometry section.

# • Solutions • Packaging •



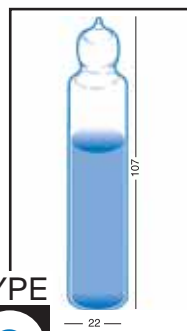
TYPE  
**A**

Glass ampoule containing 1 cm<sup>3</sup> of standard solution



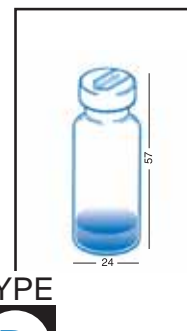
TYPE  
**B**

Glass ampoule containing 5 cm<sup>3</sup> of standard solution



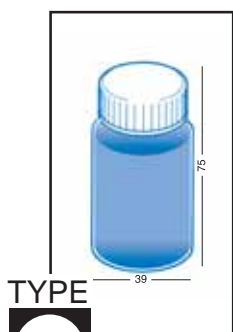
TYPE  
**C**

Glass ampoule containing 20 cm<sup>3</sup> of standard solution



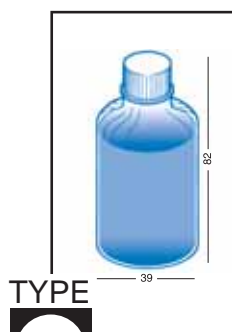
TYPE  
**D**

Standardized capped glass vial containing 1 cm<sup>3</sup> of standard solution



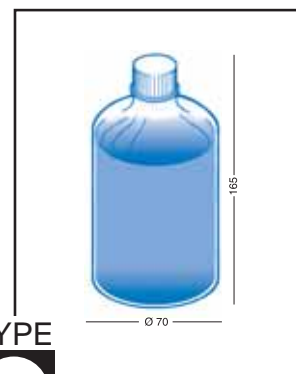
TYPE  
**E**

Plastic vial containing 50 cm<sup>3</sup> of standard solution



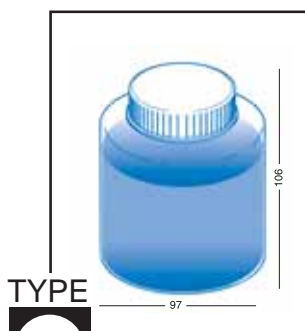
TYPE  
**F**

Plastic vial containing 50 cm<sup>3</sup> of standard solution



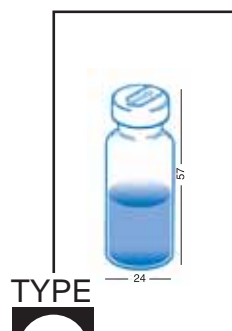
TYPE  
**G**

Plastic vial containing 500 cm<sup>3</sup> of standard solution



TYPE  
**H**

Plastic vial containing 500 cm<sup>3</sup> of standard solution



TYPE  
**L**

Standardized capped glass vial containing 5 cm<sup>3</sup> of standard solution



Glass ampoule broken tool  
Product code **9ACETLCA**

# Solutions • Available solutions: Product codes •

| Radionuclide<br>Half-life   | Chemical composition  | Product code                              | Specific activity(*) |                        | Package Volume<br>cm <sup>3</sup> | Type | Measurement uncertainty<br>% |
|---|---|---|----------------------|------------------------|-----------------------------------|------|------------------------------|
|   |   |   | kBq.g <sup>-1</sup>  | µCi.g <sup>-1</sup>    |                                   |      |                              |
| <b><sup>110</sup>Ag<sup>m</sup> + <sup>110</sup>Ag</b><br>2,50 x 10 <sup>2</sup> days | NH <sub>4</sub> OH 0,1 N                                    | AG110ELSB30                               | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 5                            |
|   |   | AG110ELSB45                               | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 5                            |
|   |   | AG110ELSB50                               | 8 x 10 <sup>3</sup>  | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 5                            |
| <b><sup>241</sup>Am</b><br>4,33 x 10 <sup>2</sup> years                               | HNO <sub>3</sub> 1 N  | AM241ELSC10                               | 4 x 10 <sup>-2</sup> | 1,1 x 10 <sup>-3</sup> | 20                                | C    | 4                            |
|   |   | AM241ELSB30                               | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 2,5                          |
|   |   | AM241ELSB45                               | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 4,5                          |
|   |   | AM241ELSA45                               | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 1                                 | A    | 2                            |
| <b><sup>133</sup>Ba</b><br>1,05 x 10 <sup>1</sup> years                               | HCl 1 N   | BA133ELSB30                               | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 1,5                          |
|   |   | BA133ELSB45                               | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 1,5                          |
|   |   | BA133ELSA50                               | 8 x 10 <sup>3</sup>  | 2,2 x 10 <sup>2</sup>  | 1                                 | A    | 1,5                          |
|   |   | BA133ELSB50                               | 8 x 10 <sup>3</sup>  | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 2                            |
|   |   | <b>Other models available on page 5.5</b> |                      |                        |                                   |      |                              |
| <b><sup>207</sup>Bi</b> <i>On request</i><br>3,28 x 10 <sup>1</sup> years             | HCl 1 N   | BI207ELSA30                               | 4 x 10 <sup>1</sup>  | 1,1                    | 1                                 | A    | 3                            |
| <b><sup>14</sup>C</b><br>5,73 x 10 <sup>3</sup> years                                 | triazol or glucose<br>+ formaldéhyde<br>in H <sub>2</sub> O | C14ELSC10                                 | 4 x 10 <sup>-2</sup> | 1,1 x 10 <sup>-3</sup> | 20                                | C    | 3                            |
|   |   | C14ELSB30                                 | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 2,5                          |
|   |   | C14ELSB45                                 | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 2,5                          |
| <b><sup>45</sup>Ca</b><br>1,63 x 10 <sup>2</sup> days                                 | HCl 0,1 N   | CA45ELSB30                                | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 3                            |
|   |   | CA45ELSB45                                | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 3                            |
| <b><sup>109</sup>Cd + <sup>109</sup>Ag<sup>m</sup></b><br>4,63 x 10 <sup>2</sup> days | HCl 1 N   | CD109ELSA50                               | 8 x 10 <sup>3</sup>  | 2,2 x 10 <sup>2</sup>  | 1                                 | A    | 4                            |
|   |   | CD109ELSB30                               | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 5                            |
|   |   | CD109ELSB45                               | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 3,5                          |
|   |   | CD109ELSB50                               | 8 x 10 <sup>3</sup>  | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 4                            |
| <b><sup>139</sup>Ce</b><br>1,38 x 10 <sup>2</sup> days                                | HCl 0,1 N   | CE139ELSB30                               | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 2,5                          |
|   |   | CE139ELSB45                               | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 2                            |
|   |   | CE139ELSB50                               | 8 x 10 <sup>3</sup>  | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 3                            |
| <b><sup>141</sup>Ce</b><br>3,25 x 10 <sup>1</sup> days                                | HCl 0,1 N   | CE141ELSB30 <sup>(*)</sup>                | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 1,5                          |
|   |   | CE141ELSB45 <sup>(*)</sup>                | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 1,5                          |
| <b><sup>36</sup>Cl</b><br>3,01 x 10 <sup>5</sup> years                                | NaCl in H <sub>2</sub> O                                    | CL36ELSC10                                | 4 x 10 <sup>-2</sup> | 1,1 x 10 <sup>-3</sup> | 20                                | C    | 2,5                          |
|   |   | CL36ELSB30                                | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 2,5                          |
|   |   | CL36ELSB45                                | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 2,5                          |
| <b><sup>244</sup>Cm</b><br>1,81 x 10 <sup>1</sup> years                               | HNO <sub>3</sub> 1 N  | CM244ELSC10                               | 4 x 10 <sup>-2</sup> | 1,1 x 10 <sup>-3</sup> | 20                                | C    | 4                            |
|   |   | CM244ELSB30                               | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 4                            |
|   |   | CM244ELSA45                               | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 1                                 | A    | 4                            |
| <b><sup>57</sup>Co</b><br>2,72 x 10 <sup>2</sup> days                                 | HCl 0,1 N   | CO57ELSA50                                | 8 x 10 <sup>3</sup>  | 2,2 x 10 <sup>2</sup>  | 1                                 | A    | 2,5                          |
|   |   | CO57ELSB30                                | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 1,5                          |
|   |   | CO57ELSB45                                | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 1,5                          |
|   |   | CO57ELSB50                                | 8 x 10 <sup>3</sup>  | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 2,5                          |
|   |   | CO57ELSD60                                | 8 x 10 <sup>4</sup>  | 2,2 x 10 <sup>3</sup>  | 1                                 | D    | 1,5                          |
| <b><sup>60</sup>Co</b><br>1,93 x 10 <sup>3</sup> days                                 | HCl 0,1 N   | CO60ELSB30                                | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 1,5                          |
|   |   | CO60ELSB45                                | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 1,5                          |
|   |   | CO60ELSB50                                | 8 x 10 <sup>3</sup>  | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 2,5                          |
|   |   | CO60ELSC10                                | 4 x 10 <sup>-2</sup> | 1,1 x 10 <sup>-3</sup> | 20                                | G    | 5                            |
|   |   | CO60ELSG10                                | 4 x 10 <sup>-2</sup> | 1,1 x 10 <sup>-3</sup> | 500                               | G    | 4                            |
|   |   | CO60ELSH10                                | 4 x 10 <sup>-2</sup> | 1,1 x 10 <sup>-3</sup> | 500                               | H    | 4                            |
|   |   | CO60ELSE15                                | 4 x 10 <sup>-1</sup> | 1,1 x 10 <sup>-2</sup> | 50                                | E    | 4                            |
|   |   | CO60ELSF15                                | 4 x 10 <sup>-1</sup> | 1,1 x 10 <sup>-2</sup> | 50                                | F    | 4                            |
| <b><sup>51</sup>Cr</b><br>2,77 x 10 <sup>1</sup> days                                 | HCl 0,1 N   | CR51ELSB30 <sup>(*)</sup>                 | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 1,5                          |
|   |   | CR51ELSB45 <sup>(*)</sup>                 | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 1,5                          |
|   |   | CR51ELSB50                                | 8 x 10 <sup>3</sup>  | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 2                            |
|   |   | CR51ELSL55 <sup>(*)</sup>                 | 4 x 10 <sup>4</sup>  | 2,2 x 10 <sup>3</sup>  | 5                                 | L    | 1,5                          |
| <b><sup>134</sup>Cs</b><br>7,55 x 10 <sup>2</sup> days                                | HCl 0,1 N   | CS134ELSC10                               | 4 x 10 <sup>-2</sup> | 1,1 x 10 <sup>-3</sup> | 20                                | C    | 2,5                          |
|   |   | CS134ELSB30                               | 4 x 10 <sup>1</sup>  | 1,1                    | 5                                 | B    | 1,5                          |
|   |   | CS134ELSB45                               | 8 x 10 <sup>2</sup>  | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 1,5                          |
|   |   | CS134ELSB50                               | 8 x 10 <sup>3</sup>  | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 2,5                          |
|   |   | CS134ELSG10                               | 4 x 10 <sup>-2</sup> | 1,1 x 10 <sup>-3</sup> | 500                               | G    | 4                            |
|   |   | CS134ELSH10                               | 4 x 10 <sup>-2</sup> | 1,1 x 10 <sup>-3</sup> | 500                               | H    | 4                            |
|   |   | CS134ELSE15                               | 4 x 10 <sup>-1</sup> | 1,1 x 10 <sup>-2</sup> | 50                                | E    | 4                            |
|   |   | CS134ELSF15                               | 4 x 10 <sup>-1</sup> | 1,1 x 10 <sup>-2</sup> | 50                                | F    | 4                            |

(\*) Manufacturing tolerance ±30%

# Solutions • Available solutions: Product codes •

| Radionuclide<br>Half-life  | Chemical composition   | Product code                              | Specific activity (*) |                        | Package Volume<br>cm <sup>3</sup> | Type | Measurement uncertainty<br>% |
|--|--|---|-----------------------|------------------------|-----------------------------------|------|------------------------------|
|  |  |   | kBq.g <sup>-1</sup>   | µCi.g <sup>-1</sup>    |                                   |      |                              |
| <b><sup>137</sup>Cs + <sup>137</sup>Ba<sup>m</sup></b><br>3,02 x 10 <sup>1</sup> years       | HCl 0,1 N  | <b>CS137ELSC10</b>                        | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 20                                | C    | 3                            |
|  |  | <b>CS137ELSB30</b>                        | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 2                            |
|  |  | <b>CS137ELSB45</b>                        | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 1,5                          |
|  |  | <b>CS137ELSB50</b>                        | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 1,5                          |
|  |  | <b>CS137ELSL55</b>                        | 4 x 10 <sup>4</sup>   | 1,1 x 10 <sup>3</sup>  | 5                                 | L    | 2,5                          |
|  |  | <b>CS137ELSG10</b>                        | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 500                               | G    | 4                            |
|  |  | <b>CS137ELSH10</b>                        | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 500                               | H    | 4                            |
|  |  | <b>CS137ELSE15</b>                        | 4 x 10 <sup>-1</sup>  | 1,1 x 10 <sup>-2</sup> | 50                                | E    | 4                            |
|  |  | <b>CS137ELSF15</b>                        | 4 x 10 <sup>-1</sup>  | 1,1 x 10 <sup>-2</sup> | 50                                | F    | 4                            |
| <b><sup>152</sup>Eu</b><br>1,35 x 10 <sup>1</sup> years                                      | HCl 1N   | <b>EU152ELSB30</b>                        | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 2                            |
|  |  | <b>EU152ELSB45</b>                        | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 1,5                          |
|  |  | <b>EU152ELSB50</b>                        | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 1,5                          |
|  |  | <b>Other models available on page 5.5</b> |                       |                        |                                   |      |                              |
| <b><sup>55</sup>Fe</b><br>9,79 x 10 <sup>2</sup> days  | HCl 0,1 N  | <b>FE55ELSB30</b>                         | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 6                            |
|  |  | <b>FE55ELSB45</b>                         | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 6                            |
| <b><sup>59</sup>Fe</b><br>4,45 x 10 <sup>1</sup> days  | HCl 1 N  | <b>FE59ELSB30<sup>(1)</sup></b>           | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 2                            |
|  |  | <b>FE59ELSB45<sup>(1)</sup></b>           | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 2                            |
|  |  | <b>FE59ELSB50<sup>(1)</sup></b>           | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 2                            |
|  |  | <b>FE59ELSL50<sup>(1)</sup></b>           | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                 | L    | 2                            |
| <b><sup>3</sup>H</b><br>1,23 x 10 <sup>1</sup> years   | H <sub>2</sub> O tritiated   | <b>H3ELSC10</b>                           | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 20                                | C    | 3,5                          |
|  |  | <b>H3ELSB30</b>                           | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 3                            |
|  |  | <b>H3ELSB45</b>                           | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 3                            |
|  |  | <b>H3ELSB50</b>                           | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 3                            |
| <b><sup>125</sup>I</b><br>5,99 x 10 <sup>1</sup> days  | NaI + Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub><br>in H <sub>2</sub> O | <b>I125ELSB30<sup>(1)</sup></b>           | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 3                            |
|  |  | <b>I125ELSB45<sup>(1)</sup></b>           | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 3                            |
|  |  | <b>I125ELSB50<sup>(1)</sup></b>           | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 3                            |
|  |  | <b>I125ELSL55<sup>(1)</sup></b>           | 4 x 10 <sup>4</sup>   | 1,1 x 10 <sup>3</sup>  | 5                                 | L    | 3                            |
| <b><sup>129</sup>I</b><br>1,57 x 10 <sup>7</sup> years                                       | NaI + Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub><br>in H <sub>2</sub> O | <b>I129ELSC10</b>                         | 4 x 10 <sup>-2</sup>  | 1,1 X10 <sup>-3</sup>  | 20                                | C    | 6,5                          |
|  |  | <b>I129ELSA30</b>                         | 4 x 10 <sup>1</sup>   | 1,1                    | 1                                 | A    | 6                            |
|  |  | <b>I129ELSG10</b>                         | 4 x 10 <sup>-2</sup>  | 1,1 X10 <sup>-3</sup>  | 500                               | G    | 7                            |
|  |  | <b>I129ELSH10</b>                         | 4 x 10 <sup>-2</sup>  | 1,1 X10 <sup>-3</sup>  | 500                               | H    | 7                            |
|  |  | <b>I129ELSE15</b>                         | 4 x 10 <sup>-1</sup>  | 1,1 X10 <sup>-2</sup>  | 50                                | E    | 7                            |
|  |  | <b>I129ELSF15</b>                         | 4 x 10 <sup>-1</sup>  | 1,1 X10 <sup>-2</sup>  | 50                                | F    | 7                            |
| <b><sup>131</sup>I</b><br>8,02 days  | NaI + Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub><br>in H <sub>2</sub> O | <b>I131ELSB30<sup>(1)</sup></b>           | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 1,5                          |
|  |  | <b>I131ELSB45<sup>(1)</sup></b>           | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 1,5                          |
|  |  | <b>I131ELSB50</b>                         | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 1,5                          |
|  |  | <b>I131ELSG10<sup>(1)</sup></b>           | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 500                               | G    | 5                            |
|  |  | <b>I131ELSH10<sup>(1)</sup></b>           | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 500                               | H    | 5                            |
|  |  | <b>I131ELSE15<sup>(1)</sup></b>           | 4 x 10 <sup>-1</sup>  | 1,1 x 10 <sup>-2</sup> | 50                                | E    | 5                            |
|  |  | <b>I131ELSF15<sup>(1)</sup></b>           | 4 x 10 <sup>-1</sup>  | 1,1 x 10 <sup>-2</sup> | 50                                | F    | 5                            |
|  |  | <b>I131ELSL55<sup>(1)</sup></b>           | 4 x 10 <sup>4</sup>   | 1,1 x 10 <sup>3</sup>  | 5                                 | L    | 1,5                          |
| <b><sup>54</sup>Mn</b><br>3,12 x 10 <sup>2</sup> days  | HCl 0,1 N  | <b>MN54ELSA50</b>                         | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 1                                 | A    | 1,5                          |
|  |  | <b>MN54ELSB30</b>                         | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 2                            |
|  |  | <b>MN54ELSB45</b>                         | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 2                            |
|  |  | <b>MN54ELSB50</b>                         | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                 | B    | 1,5                          |
|  |  |   |                       |                        |                                   |      |                              |
| <b><sup>22</sup>Na</b><br>9,50 x 10 <sup>2</sup> days  | HCl 0,1 N  | <b>NA22ELSC10</b>                         | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 20                                | C    | 2                            |
|  |  | <b>NA22ELSB30</b>                         | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 1,5                          |
|  |  | <b>NA22ELSB45</b>                         | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 1,5                          |
|  |  | <b>NA22ELSA50</b>                         | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 1                                 | A    | 2                            |
| <b><sup>63</sup>Ni</b><br>1,00 x 10 <sup>2</sup> years                                       | HCl 0,1 N  | <b>NI63ELSB30</b>                         | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 3,5                          |
|  |  | <b>NI63ELSA45</b>                         | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 1                                 | A    | 3,5                          |
| <b><sup>237</sup>Np + <sup>233</sup>Pa</b> <i>On request</i><br>2,14 x 10 <sup>6</sup> years | C <sub>2</sub> H <sub>2</sub> O <sub>4</sub><br>in HCL 6N                  | <b>NP237ELSC10</b>                        | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 20                                | C    | 6                            |
|  |  | <b>NP237ELSB30</b>                        | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 5                            |
|  |  | <b>NP237ELSA45</b>                        | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 1                                 | A    | 5                            |
| <b><sup>32</sup>P</b><br>1,43 x 10 <sup>1</sup> days   | HCl 0,1 N  | <b>P32ELSB30<sup>(1)</sup></b>            | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 3                            |
|  |  | <b>P32ELSB45<sup>(1)</sup></b>            | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                 | B    | 3                            |
|  |  | <b>P32ELSL55<sup>(1)</sup></b>            | 4 x 10 <sup>4</sup>   | 1,1 x 10 <sup>3</sup>  | 5                                 | L    | 3                            |
| <b><sup>210</sup>Pb</b> <i>On request</i><br>2,22 x 10 <sup>1</sup> years                    | HNO <sub>3</sub> 3 N   | <b>PB210ELSB30</b>                        | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                 | B    | 4,5                          |
|  |  | <b>PB210ELSA45</b>                        | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 1                                 | A    | 4,5                          |

**Legend:** Environmental monitoring

Liquid scintillation counting

(\*) Manufacturing tolerance ±30%

(1) Lead time : see production schedule at the last page of the catalogue.

# Solutions • Available solutions: Product codes •

| Radionuclide<br>Half-life   | Chemical<br>composition                             | Product code                      | Specific activity (*) |                        | Package<br>Volume<br>cm <sup>3</sup> | Type | Measurement<br>uncertainty<br>% |
|---|---|-----------------------------------|-----------------------|------------------------|--------------------------------------|------|---------------------------------|
|   |   |                                   | kBq.g <sup>-1</sup>   | µCi.g <sup>-1</sup>    |                                      |      |                                 |
| <b><sup>147</sup>Pm</b><br>9,58 x 10 <sup>2</sup> days  | HCl 0,1 N   | <b>PM147ELSB30</b>                | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 3                               |
|   |   | <b>PM147ELSB45</b>                | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                    | B    | 3                               |
| <b><sup>238</sup>Pu</b><br>8,77 x 10 <sup>1</sup> years   | HNO <sub>3</sub> 3 N                                | <b>PU238ELSC10</b>                | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 20                                   | C    | 4                               |
|   |   | <b>PU238ELSB30</b>                | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 4                               |
|   |   | <b>PU238ELSA45</b>                | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 1                                    | A    | 4                               |
| <b><sup>239</sup>Pu</b><br>2,41 x 10 <sup>4</sup> years   | HNO <sub>3</sub> 3 N                                | <b>PU239ELSC10</b>                | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 20                                   | C    | 4                               |
|   |   | <b>PU239ELSB30</b>                | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 4                               |
|   |   | <b>PU239ELSA45</b>                | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 1                                    | A    | 4                               |
| <b><sup>103</sup>Ru + <sup>103</sup>Rh<sup>m</sup></b><br>3,93 x 10 <sup>1</sup> days   | HCl 0,1 N   | <b>RU103ELSB30</b> <sup>(1)</sup> | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 2                               |
|   |   | <b>RU103ELSB45</b> <sup>(1)</sup> | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                    | B    | 2                               |
| <b><sup>35</sup>S</b><br>8,74 x 10 <sup>1</sup> days  | Na <sub>2</sub> SO <sub>4</sub> in H <sub>2</sub> O | <b>S35ELSB30</b> <sup>(1)</sup>   | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 3                               |
|   |   | <b>S35ELSB45</b> <sup>(1)</sup>   | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                    | B    | 3                               |
| <b><sup>113</sup>Sn + <sup>113</sup>In<sup>m</sup></b><br>1,15 x 10 <sup>2</sup> days   | HCl 6 N   | <b>SN113ELSB30</b> <sup>(1)</sup> | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 2                               |
|   |   | <b>SN113ELSB45</b> <sup>(1)</sup> | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                    | B    | 2                               |
|   |   | <b>SN113ELSB50</b> <sup>(1)</sup> | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                    | B    | 2,5                             |
|   |   | <b>SN113ELSL50</b> <sup>(1)</sup> | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                    | L    | 2                               |
| <b><sup>85</sup>Sr</b><br>6,49 x 10 <sup>1</sup> days   | HCl 0,1 N   | <b>SR85ELSB30</b> <sup>(1)</sup>  | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 2                               |
|   |   | <b>SR85ELSB45</b> <sup>(1)</sup>  | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                    | B    | 2                               |
|   |   | <b>SR85ELSB50</b> <sup>(1)</sup>  | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                    | B    | 2,5                             |
| <b><sup>89</sup>Sr</b><br>5,06 x 10 <sup>1</sup> days   | HNO <sub>3</sub> 1 N                                | <b>SR89ELSB30</b> <sup>(1)</sup>  | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 2                               |
|   |   | <b>SR89ELSB45</b> <sup>(1)</sup>  | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                    | B    | 2                               |
| <b><sup>90</sup>Sr in equilibrium with <sup>90</sup>Y</b><br>2,82 x 10 <sup>1</sup> years<br>Activity given in<br><sup>90</sup> Sr only | HCl 0,1 N   | <b>SR90ELSC10</b>                 | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 20                                   | C    | 3                               |
|   |   | <b>SR90ELSB30</b>                 | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 3                               |
|   |   | <b>SR90ELSB45</b>                 | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                    | B    | 3                               |
|   |   | <b>SR90ELSB50</b>                 | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                    | B    | 3                               |
|   |   | <b>SR90ELSG10</b>                 | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 500                                  | G    | 3                               |
|   |   | <b>SR90ELSH10</b>                 | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 500                                  | H    | 3                               |
|   |   | <b>SR90ELSE15</b>                 | 4 x 10 <sup>-1</sup>  | 1,1 x 10 <sup>-2</sup> | 50                                   | E    | 3                               |
|   |   | <b>SR90ELSF15</b>                 | 4 x 10 <sup>-1</sup>  | 1,1 x 10 <sup>-2</sup> | 50                                   | F    | 3                               |
| <b>SR90ELSL55</b>   | 4 x 10 <sup>4</sup>                                 | 2,2 x 10 <sup>3</sup>             | 5                     | L                      | 2,5                                  |      |                                 |
| <b><sup>99</sup>Tc</b><br>2,14 x 10 <sup>5</sup> years  | NH <sub>4</sub> OH 0,1 N                            | <b>TC99ELSB30</b>                 | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 4                               |
|   |   | <b>TC99ELSB45</b>                 | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                    | B    | 4                               |
|   |   | <b>TC99ELSA50</b>                 | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 1                                    | A    | 4                               |
| <b><sup>204</sup>Tl</b><br>1,38 x 10 <sup>3</sup> days  | HCl 0,1 N   | <b>TL204ELSB30</b>                | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 3                               |
|   |   | <b>TL204ELSB45</b>                | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                    | B    | 3                               |
| <b><sup>232</sup>U</b><br>70 years  | HNO <sub>3</sub> 1 N                                | <b>U232ELSA45</b>                 | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 1                                    | A    | 5                               |
| <b><sup>88</sup>Y</b><br>1,07 x 10 <sup>2</sup> days  | HCl 0,1 N   | <b>Y88ELSB30</b> <sup>(1)</sup>   | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 2                               |
|   |   | <b>Y88ELSB45</b> <sup>(1)</sup>   | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                    | B    | 1,5                             |
|   |   | <b>Y88ELSA50</b> <sup>(1)</sup>   | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 1                                    | A    | 1,5                             |
|   |   | <b>Y88ELSB50</b> <sup>(1)</sup>   | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                    | B    | 2                               |
| <b><sup>65</sup>Zn</b><br>2,44 x 10 <sup>2</sup> days   | HCl 0,1 N   | <b>ZN65ELSC10</b>                 | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 20                                   | C    | 2,5                             |
|   |   | <b>ZN65ELSH10</b>                 | 4 x 10 <sup>-2</sup>  | 1,1 x 10 <sup>-3</sup> | 500                                  | H    | 3                               |
|   |   | <b>ZN65ELSE15</b>                 | 4 x 10 <sup>-1</sup>  | 1,1 x 10 <sup>-2</sup> | 50                                   | E    | 3                               |
|   |   | <b>ZN65ELSF15</b>                 | 4 x 10 <sup>-1</sup>  | 1,1 x 10 <sup>-2</sup> | 50                                   | F    | 3                               |
|   |   | <b>ZN65ELSB30</b>                 | 4 x 10 <sup>1</sup>   | 1,1                    | 5                                    | B    | 2                               |
|   |   | <b>ZN65ELSB45</b>                 | 8 x 10 <sup>2</sup>   | 2,2 x 10 <sup>1</sup>  | 5                                    | B    | 1,5                             |
|   |   | <b>ZN65ELSB50</b>                 | 8 x 10 <sup>3</sup>   | 2,2 x 10 <sup>2</sup>  | 5                                    | B    | 1,5                             |

(\*) Manufacturing tolerance ±30%

## Legend :

Environmental monitoring

Liquid scintillation counting

(1) Lead time : see production schedule at the last page of the catalogue

To order : see Commercial Information on pages I.1 - I.5 of the INFORMATION section

# • Solutions • Solutions and accessories •

**On request**

| Chemical form (*)   | $\pm 15\%$  | $\pm 5\%$                   |
|---|---|-----------------------------|
| <sup>32</sup> Si Silicium sodium in 0,1M NaOH                   | Nominal solution                                      | or standard solution        |
| <sup>75</sup> Se Selenium acide in 0,1M HCl                     | Nominal solution                                      | or standard solution        |
| <sup>106</sup> Ru   | Nominal solution                                      | or standard solution        |
| <sup>226</sup> Ra Radium nitrate in 1M HNO <sub>3</sub>         | <b>Nominal solution</b>                               | <b>or standard solution</b> |
| <sup>228</sup> Th Thorium nitrate in 0,1M HNO <sub>3</sub>      | Nominal solution                                      | or standard solution        |
| <sup>229</sup> Th Thorium nitrate in 0,1M HNO <sub>3</sub>      | Nominal solution                                      | or standard solution        |
| <sup>230</sup> Th Thorium nitrate in 0,1M HNO <sub>3</sub>      | Nominal solution                                      | or standard solution        |
| <sup>232</sup> Th Thorium nitrate in H <sub>2</sub> O           | Nominal solution                                      | or standard solution        |
| <sup>232</sup> U Without carrier in 1M HNO <sub>3</sub>         | <b>Standard solution 3,7 kBq and 18,5 kBq in 5 ml</b> |                             |
| <sup>233</sup> U Without carrier in 1M HNO <sub>3</sub>         | <b>Standard solution 3,7 kBq and 18,5 kBq in 5 ml</b> |                             |
| <sup>236</sup> U Nitrate d'uranium in nitric acid               | Nominal solution                                      | or standard solution        |
| <sup>237</sup> Np   | <b>Nominal solution</b>                               | <b>or standard solution</b> |
| <sup>241</sup> Pu Plutonium nitrate in 4M HNO <sub>3</sub>      | <b>Nominal solution</b>                               | <b>or standard solution</b> |
| <sup>242</sup> Pu   | <b>Standard solution - Activity less than 500 Bq</b>  |                             |
| <sup>243</sup> Am Americium chloride in 1M HCl                  | <b>Nominal solution</b>                               | <b>or standard solution</b> |
| <sup>252</sup> Cf Californium nitrate in 0,1 M HNO <sub>3</sub> | Nominal solution                                      | or standard solution        |

(\*) Chemical form can be reajusted without notice

## • Carrier

(for a dilution of mononuclide solution up to 1 liter)

| Product code   | Volume (cm <sup>3</sup> ) |
|----------------|---------------------------|
| <b>9ACETEP</b> | 10                        |

## • Accessories

| Vials                         | Volume (cm <sup>3</sup> ) | Type  | Product code   |
|-------------------------------|---------------------------|-------|----------------|
| Glass, <i>penicillin type</i> | 15                        | L & D | <b>9ACETL4</b> |
| Black plastic                 | 55                        | E     | <b>9ACETL5</b> |
| Translucent plastic           | 550                       | H     | <b>9ACETL6</b> |
| Brown plastic                 | 55                        | F     | <b>9ACETL7</b> |
| Brown plastic                 | 550                       | G     | <b>9ACETL8</b> |

| Lead containers                                 | Internal diameter (mm) | Internal length (mm) | Wall Thickness (mm) | Product code   |
|---|------------------------|----------------------|---------------------|----------------|
| For type B glass ampoule                        | 24                     | 100                  | 5                   | <b>9ACETPU</b> |
| For D/L or penicillin-type glass vial with caps | 24                     | 60                   | 5                   | <b>9ACETPV</b> |
| For customized vial with caps                   | 26,5                   | 63                   | 5                   | <b>9ACETPR</b> |

To order : see Commercial Information on pages 1.1 - 1.5 of the INFORMATION section