

# MYCOTOXIN STANDARDS

Single- and Multi-Component Standards

$^{13}\text{C}$  Isotopically Labeled Standards

Matrix Certified Reference Materials

Dried Down Standards



Some fungal genera like *Aspergillus*, *Fusarium*, *Penicillium*, etc., produce mycotoxins. These toxic secondary metabolites are harmful to animal and human health if they enter the food chain via contaminated crops and fruits or through processed food and feed products. Therefore, in at least 100 countries, limits are set for mycotoxin levels in food and feed. For a precise detection of all regulated mycotoxins, we offer a comprehensive range of standards, including mixture solutions, <sup>13</sup>C isotopically labeled standards, certified reference materials (CRM) and dried down standards.

Find our products at [sigma-aldrich.com/mycotoxins](https://sigma-aldrich.com/mycotoxins)

## Mycotoxin Reference Materials (Neats)

For accurate and reliable results, we currently offer 5 mg neat reference materials with certified concentrations for various mycotoxins. Try our reference materials for the calibration of your analytical instruments and recovery experiments.

| Cat. No. | Product Description      | Pkg (mg) |
|----------|--------------------------|----------|
| 32927    | 3-Acetyldeoxynivalenol   | 5        |
| 32928    | 15-Acetyldeoxynivalenol  | 5        |
| 32754    | Aflatoxin B <sub>1</sub> | 5        |
| 32755    | Aflatoxin B <sub>2</sub> | 5        |
| 32756    | Aflatoxin G <sub>1</sub> | 5        |
| 32757    | Aflatoxin G <sub>2</sub> | 5        |
| 32943    | Deoxynivalenol           | 5        |
| 32936    | Fumonisin B <sub>1</sub> | 5        |

| Cat. No. | Product Description | Pkg (mg) |
|----------|---------------------|----------|
| 33438    | Fusarenon-X         | 5        |
| 32932    | Neosolaniol         | 5        |
| 32929    | Nivalenol Hydrate   | 5        |
| 32937    | Ochratoxin A        | 5        |
| 32759    | Patulin             | 5        |
| 32609    | Sterigmatocystin    | 5        |
| 33947    | T-2 Toxin           | 5        |
| 32939    | Zearalenone         | 5        |



## Mycotoxin Single-Component Standard Solutions

For precise quality control of food and feed, we offer single-component standard solutions of the most important mycotoxins in various concentrations and different solvents.

| Cat. No. | Product Description                  | Concn (µg/g) | Solvent            | Pkg (mg) |
|----------|--------------------------------------|--------------|--------------------|----------|
| 34132    | 3-Acetyldeoxynivalenol               | 100          | Acetonitrile       | 2        |
| 34133    | 15-Acetyldeoxynivalenol              | 100          | Acetonitrile       | 2        |
| 34129    | Acetyl-Deoxynivalenol-D <sub>3</sub> | 100          | Acetonitrile       | 2        |
| 34029    | Aflatoxin B <sub>1</sub>             | 2            | Acetonitrile       | 2        |
| 34034    | Aflatoxin B <sub>2</sub>             | 0.5          | Acetonitrile       | 2        |
| 34032    | Aflatoxin G <sub>1</sub>             | 2            | Acetonitrile       | 2        |
| 34033    | Aflatoxin G <sub>2</sub>             | 0.5          | Acetonitrile       | 2        |
| 34031    | Aflatoxin M <sub>1</sub>             | 0.5          | Acetonitrile       | 2        |
| 35405    | α-Zearalanol                         | 10           | Acetonitrile       | 1        |
| 35406    | α-Zearalanol                         | 10           | Acetonitrile       | 1        |
| 35407    | β-Zearalanol                         | 10           | Acetonitrile       | 1        |
| 35409    | β-Zearalanol                         | 10           | Acetonitrile       | 1        |
| 35410    | Citrinin                             | 100          | Acetonitrile       | 1        |
| 34155    | Deoxynivalenol-D <sub>1</sub>        | 100          | Acetonitrile       | 2        |
| 34135    | Deepoxy-deoxynivalenol               | 50           | Acetonitrile       | 2        |
| 34124    | Deoxynivalenol                       | 100          | Acetonitrile       | 2        |
| 32911    | Deoxynivalenol-3-glucoside           | 50           | Acetonitrile       | 1        |
| 34137    | Diacetoxyscirpenol                   | 100          | Acetonitrile       | 2        |
| 37017    | Fumagillin                           | 100          | Acetonitrile       | 1        |
| 34139    | Fumonisin B <sub>1</sub>             | 50           | Acetonitrile/Water | 2        |
| 34142    | Fumonisin B <sub>2</sub>             | 50           | Acetonitrile/Water | 2        |
| 32606    | Fumonisin B <sub>3</sub>             | 50           | Acetonitrile/Water | 1        |

| Cat. No. | Product Description | Concn (µg/g) | Solvent            | Pkg (mg) |
|----------|---------------------|--------------|--------------------|----------|
| 34130    | Fusarenon-X         | 100          | Acetonitrile       | 2        |
| 35598    | Gliotoxin           | 100          | Acetonitrile       | 1        |
| 34136    | HT-2 Toxin          | 100          | Acetonitrile       | 2        |
| 37013    | Moniliformin        | 100          | Acetonitrile/Water | 1        |
| 34138    | Neosolaniol         | 100          | Acetonitrile       | 2        |
| 34131    | Nivalenol           | 100          | Acetonitrile       | 2        |
| 34037    | Ochratoxin A        | 10           | Acetonitrile       | 2        |
| 32411    | Ochratoxin B        | 10           | Acetonitrile       | 2        |
| 34127    | Patulin             | 100          | Acetonitrile       | 2        |
| 35417    | Paxilline           | 100          | Acetonitrile       | 1        |
| 32986    | Sterigmatocystin    | 50           | Acetonitrile       | 1        |
| 32914    | T-2 Tetraol         | 50           | Acetonitrile       | 1        |
| 34071    | T-2 Toxin           | 100          | Acetonitrile       | 2        |
| 32913    | T-2 Triol           | 50           | Acetonitrile       | 1        |
| 37016    | Verruculogen        | 100          | Acetonitrile       | 1        |
| 35441    | Wortmannin          | 100          | Acetonitrile       | 1        |
| 32193    | Zearalanone         | 10           | Acetonitrile       | 1.2      |
| 34126    | Zearalenone         | 100          | Acetonitrile       | 2        |

## Mycotoxin Mixture Standard Solutions For Multi-Analyte Detection

For a detailed analysis of individual mycotoxins in multitoxin samples, we offer nine mixtures of mycotoxin groups which often occur naturally in various proportions in food and feed samples.

| Cat. No. | Product Description | Components                                                         | Concn (µg/g) | Solvent            | Pkg (mg) |
|----------|---------------------|--------------------------------------------------------------------|--------------|--------------------|----------|
| 34036    | Aflatoxin Mix 4     | B <sub>1</sub> , G <sub>1</sub><br>B <sub>2</sub> , G <sub>2</sub> | 2<br>0.5     | Acetonitrile       | 1, 2     |
| 33415    | Aflatoxin Mix 4     | B <sub>1</sub> , G <sub>1</sub> , B <sub>2</sub> , G <sub>2</sub>  | 20 (each)    | Acetonitrile       | 2        |
| 34143    | Fumonisin Mix       | FB <sub>1</sub> , FB <sub>2</sub>                                  | 50 (each)    | Acetonitrile/Water | 2        |
| 32926    | Trichothecene Mix   | 3-AcDON, DON,<br>NIV, FusX, HAT-2,<br>T-2, DAS, ZON                | 10 (each)    | Acetonitrile       | 1        |
| 34134    | B-Trichothecen Mix  | DON, NIV,<br>3 – AcDON,<br>15 – AcDON                              | 100          | Acetonitrile       | 2        |



## <sup>13</sup>C Isotopically Labeled Internal Standards Solutions for LC-MS

Fully <sup>13</sup>C isotope-labeled mycotoxin standards (e.g, Aflatoxin B<sub>1</sub>-<sup>13</sup>C<sub>17</sub>; **Figure 1**) are stable, non-radioactive isotopically labeled versions of the target analyte with the same physiochemical and chromatographic behaviors. These internal standards provide an accurate detection, as they show an optimal mass unit difference between the analyte and the standard, which prevents interference. They also account for variations during sample preparation, cleanup and ionization. We offer labeled Aflatoxins (B<sub>1</sub>, B<sub>2</sub>, G<sub>1</sub> and G<sub>2</sub>), Fumonisin (B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>), Deoxynivalenol and six other mycotoxin standards.

| Cat. No. | Product Description                                      | Concn (µg/g) | Solvent            | Pkg (mg) |
|----------|----------------------------------------------------------|--------------|--------------------|----------|
| 32962    | 3-Acetyldeoxynivalenol- <sup>13</sup> C <sub>17</sub>    | 25           | Acetonitrile       | 1        |
| 32764    | Aflatoxin B <sub>1</sub> - <sup>13</sup> C <sub>17</sub> | 0.5          | Acetonitrile       | 1        |
| 32771    | Aflatoxin B <sub>2</sub> - <sup>13</sup> C <sub>17</sub> | 0.5          | Acetonitrile       | 1        |
| 32772    | Aflatoxin G <sub>1</sub> - <sup>13</sup> C <sub>17</sub> | 0.5          | Acetonitrile       | 1        |
| 32777    | Aflatoxin G <sub>2</sub> - <sup>13</sup> C <sub>17</sub> | 0.5          | Acetonitrile       | 1        |
| 32488    | Chloramphenicol- <sup>13</sup> C <sub>11</sub>           | 25           | Acetonitrile       | 1.2      |
| 32489    | Cyclosporine A- <sup>13</sup> C <sub>62</sub>            | 25           | Acetonitrile       | 1.2      |
| 34128    | Deoxynivalenol- <sup>13</sup> C <sub>15</sub>            | 25           | Acetonitrile       | 1        |
| 33621    | Fumonisin B <sub>1</sub> - <sup>13</sup> C <sub>34</sub> | 25           | Acetonitrile/Water | 1        |
| 32915    | Fumonisin B <sub>2</sub> - <sup>13</sup> C <sub>34</sub> | 10           | Acetonitrile/Water | 1        |
| 32916    | Fumonisin B <sub>3</sub> - <sup>13</sup> C <sub>34</sub> | 10           | Acetonitrile/Water | 1        |
| 32491    | Griseofulvin- <sup>13</sup> C <sub>17</sub>              | 25           | Acetonitrile       | 1.2      |
| 33842    | HT-2 Toxin- <sup>13</sup> C <sub>22</sub>                | 25           | Acetonitrile       | 1        |
| 32773    | Mycophenolic acid- <sup>13</sup> C <sub>17</sub>         | 25           | Acetonitrile       | 1        |
| 32192    | Nivalenol- <sup>13</sup> C <sub>15</sub>                 | 25           | Acetonitrile       | 1.2      |
| 33416    | Ochratoxin A- <sup>13</sup> C <sub>20</sub>              | 10           | Acetonitrile       | 1        |
| 35516    | Patulin- <sup>13</sup> C <sub>7</sub>                    | 25           | Acetonitrile       | 1.2      |
| 32244    | Tenuazonic acid-(acetyl- <sup>13</sup> C <sub>2</sub> )  | 50           | Acetonitrile       | 2        |
| 33892    | T-2 Toxin- <sup>13</sup> C <sub>24</sub>                 | 25           | Acetonitrile       | 1        |
| 32758    | Zearalenone- <sup>13</sup> C <sub>18</sub>               | 25           | Acetonitrile       | 1        |

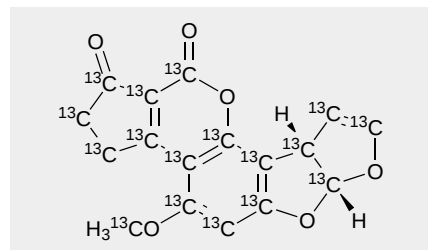
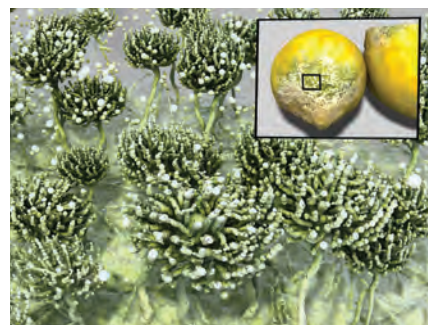


Figure 1. Molecular structure of a fully <sup>13</sup>C isotope-labeled Aflatoxin B<sub>1</sub>-<sup>13</sup>C<sub>17</sub>



## Dried Down Mycotoxin Standards (RMs)

We offer reference materials such as dried down standards which are packaged in amber ampoules to ensure stability. The convenient reconstitution of these standards, made possible by the addition of an appropriate solvent, is described in the Certificate of Analysis enclosed with the product.

| Cat. No. | Product Description        | Concn (µg/g) | Pkg (mg) |
|----------|----------------------------|--------------|----------|
| 35758    | Alternariol                | 100          | 0.1      |
| 35762    | Alternariol-9-methyl ether | 100          | 0.1      |
| 37012    | Beauvericin (BEA)          | 100          | 0.1      |
| 35878    | Citreoviridin A            | 100          | 0.1      |
| 35970    | Meleagrins                 | 100          | 0.1      |
| 37025    | Retrorsine                 | 50           | 0.05     |
| 35976    | Stachybotrylactam          | 100          | 0.1      |
| 35977    | Tentoxin                   | 100          | 0.1      |
| 37018    | Tenuazonic acid            | 100          | 0.1      |

## Certified Matrix Reference Materials (CRMs) For Mycotoxin Analysis

CRMs released from IRMM and distributed by Sigma-Aldrich are produced with raw materials to more accurately resemble actual samples in their natural state. For performance control of mycotoxin analysis, we offer compound feed, maize, wheat and peanut butter reference materials.

| Cat. No. | Product Description                                | Component                | Concn (µg/g) | Pkg (mg) |
|----------|----------------------------------------------------|--------------------------|--------------|----------|
| BCR375   | Compound Feed (Aflatoxin blank)                    | Aflatoxin B <sub>1</sub> | <1           | 50       |
| ERMBE375 | Compound Feedingstuff (Aflatoxins, very low level) | Aflatoxin B <sub>1</sub> | 2.6          | 2×75     |
|          |                                                    | Aflatoxin B <sub>2</sub> | 0.20         | —        |
|          |                                                    | Aflatoxin G <sub>1</sub> | 0.4          | —        |
|          |                                                    | Aflatoxin G <sub>2</sub> | <0.2         | —        |
| ERMBE376 | Compound Feedingstuff (Aflatoxins, high level)     | Aflatoxin B <sub>1</sub> | 12.9         | 2×75     |
|          |                                                    | Aflatoxin B <sub>2</sub> | 0.68         | —        |
|          |                                                    | Aflatoxin G <sub>1</sub> | 5.2          | —        |
| BCR262R  | Defatted Peanut Meal (Aatoxin B1, blank)           | Aflatoxin B <sub>1</sub> | <3.0         | 100      |
| ERMBC716 | Maize (Zearalenone, very low level)                | Zearalenone              | <5           | 60       |
| ERMBC717 | Maize (Zearalenone, low level)                     | Zearalenone              | 83           | 60       |
| BCR377   | Maize Flour (Deoxynivalenol, blank)                | Deoxynivalenol           | <50          | 150      |
| BCR401R  | Peanut Butter (Aflatoxin, low level)               | Aflatoxin B <sub>1</sub> | <0.2         | 100      |
|          |                                                    | Aflatoxin B <sub>2</sub> | (each)       | —        |
|          |                                                    | Aflatoxin G <sub>1</sub> | —            | —        |
|          |                                                    | Aflatoxin G <sub>2</sub> | —            | —        |
| BCR471   | Wheat (Ochratoxin A, blank)                        | Ochratoxin A             | <0.6         | 55       |

## Mycotoxin Solutions CRMs from IRMM®

The mycotoxin CRM solutions from IRMM provide an accurate determination of detection limits as well as validation of analytical methods. These standards are certified according to the ISO Guides 34 and 35 as described in the Certificate of Analysis enclosed with the product. All mycotoxins are dissolved in acetonitrile and solutions are placed in 4 mL amber glass ampules. We offer Aflatoxin M<sub>1</sub> dissolved in chloroform.



| Cat. No. | Component                | Concn (µg/g) | Solvent      | Pkg (mg) |
|----------|--------------------------|--------------|--------------|----------|
| ERMAC057 | Aflatoxin B <sub>1</sub> | 3.79         | Acetonitrile | 4        |
| ERMAC058 | Aflatoxin B <sub>2</sub> | 3.80         | Acetonitrile | 4        |
| ERMAC059 | Aflatoxin G <sub>1</sub> | 3.78         | Acetonitrile | 4        |
| ERMAC060 | Aflatoxin G <sub>2</sub> | 3.80         | Acetonitrile | 4        |
| IRMM315  | 4-Deoxynivalenol         | 25.1         | Acetonitrile | 4        |
| IRMM316  | Nivalenol                | 24.0         | Acetonitrile | 4        |
| BCR423RM | Aflatoxin M <sub>1</sub> | 9.93         | Chloroform   | 2.5      |
| ERMAC699 | Zearalenone              | 9.95         | Acetonitrile | 4        |

## Certified Reference Material (CRM) Solutions – TraceCERT®

Proper calibration of the HPLC instrument is critical to ensure accurate measurement of the mycotoxins present in the samples due to the toxicity of these materials. Our CRM mixtures are produced in a doubly accredited laboratory fulfilling ISO/IEC 17025 and ISO Guide 34. The standards are certified analytically using direct spectrophotometry and/or HPLC with UV detection. A Certificate of Analysis fulfilling ISO Guide 31 requirements is shipped with each product.

| Cat. No. | Component                                                                                    | Concn (µg/g)        | Solvent                       | Pkg (mg) |
|----------|----------------------------------------------------------------------------------------------|---------------------|-------------------------------|----------|
| CRM46323 | Aflatoxin B <sub>1</sub>                                                                     | 3                   | Benzene:Acetonitrile (98:2)   | 1        |
| CRM44647 | Aflatoxin B <sub>1</sub>                                                                     | 20                  | Methanol                      | 1        |
| CRM46324 | Aflatoxin B <sub>2</sub>                                                                     | 3                   | Benzene:Acetonitrile (98:2)   | 1        |
| CRM46325 | Aflatoxin G <sub>1</sub>                                                                     | 3                   | Benzene:Acetonitrile (98:2)   | 1        |
| CRM46326 | Aflatoxin G <sub>2</sub>                                                                     | 3                   | Benzene:Acetonitrile (98:2)   | 1        |
| CRM46319 | Aflatoxin M <sub>1</sub>                                                                     | 10                  | Acetonitrile                  | 1        |
| CRM46304 | Aflatoxin Mix B <sub>1</sub> & G <sub>1</sub> B <sub>2</sub> & G <sub>2</sub>                | 1 (each) 0.3 (each) | Methanol                      | 5×1      |
| CRM46303 | Aflatoxin Mix B <sub>1</sub> & G <sub>1</sub> B <sub>2</sub> & G <sub>2</sub>                | 1 (each) 0.3 (each) | Methanol                      | 5        |
| CRM46300 | Aflatoxin Mix B <sub>1</sub> & G <sub>1</sub> B <sub>2</sub> & G <sub>2</sub>                | 1 (each) 3 (each)   | Benzene:Acetonitrile (98:2)   | 5×1      |
| CRM46911 | Deoxynivalenol                                                                               | 200                 | Ethyl acetate:Methanol (95:5) | 1        |
| CRM40139 | Japanese Aflatoxin Mixture B <sub>1</sub> , G <sub>1</sub> , B <sub>2</sub> & G <sub>2</sub> | 25 (each)           | Acetonitrile                  | 5×1      |
| CRM46912 | Ochratoxin A                                                                                 | 50                  | Benzene:Acetic Acid (99:1)    | 1        |
| CRM46914 | Patulin                                                                                      | 100                 | Chloroform                    | 1        |
| CRM46916 | Zearalenone                                                                                  | 50                  | Acetonitrile                  | 1        |

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