



High purity metals and materials

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## Introduction

Alfa Aesar™, now part of Thermo Fisher Scientific™, offers a broad range of high purity metals and materials, virtually all of which are available from stock for immediate shipment. No matter what your application, we are able to supply pure metals, alloys and non-metallic elements in various purities and forms to meet most specifications. A wide range of resources for manufacturing and fabrication are available to meet most specialty requirements.

In addition to pure elements and alloys, you will find here a variety of forms of carbon, ceramics for high temperature applications, evaporation materials, products for brazing, optics, crystals and even a selection of fuel cell grade catalysts.

Count on Alfa Aesar for:

- Highest purity and quality products
- Outstanding delivery and service
- Competitive pricing for large and small quantities

Find the full range of high purity metals and materials online at [www.alfa.com/metals-materials](http://www.alfa.com/metals-materials)

## Pure elements

Our broad range of pure elements, from Aluminum to Zirconium, are designed to meet a wide variety of high technology applications. Different purities and forms are provided to correspond to the demands of many different uses and applications. Representative physical properties and additional facts pertaining to each element are available. Our range of pure elements contains over 1400 products.

A selection of our pure elements can be found in the table below.

| Stock No. | Description   |
|-----------|---|
| 00905     | Bromine liquid, 99.8%   |
| 10146     | Cesium, 99.98% (metals basis)   |
| 40317     | Gold shot, semi-spherical, 6.35mm (0.25in) & down, Premion®, 99.999% (metals basis)             |
| 10195     | Gold wire, 0.2mm (0.008in) diam., 99.9% (metals basis)  |
| 10769     | Lithium foil, 0.75mm (0.03in) thick x 19mm (0.75in) wide, 99.9% (metals basis)                  |
| 10283     | Platinum gauze, 52 mesh woven from 0.1mm (0.004in) diam., wire, 99.9% (metals basis)            |
| 13374     | Platinum slug, 6.35mm (0.25in) diam. x 12.7mm (0.50in) length, Premion®, 99.99+% (metals basis) |
| 11435     | Silver wire, 2.0mm (0.08in) diam., annealed, 99.9% (metals basis)                               |
| 13783     | Vanadium foil, 0.127mm (0.005in) thick, 99.8% (metals basis)                                    |
| 10441     | Zirconium sponge, 0.8-25.4mm (0.03-1.0in), 99.5%, Zr & Hf                                       |

Full product listing and pack sizes available online [www.alfa.com/pure-elements](http://www.alfa.com/pure-elements)

## Alloys

We offer a wide variety of alloys in several compositions and forms. Our range of alloys contains over 250 products. Aluminum alloys for use in many industries such as equipment, machinery, vehicles and various specialized applications. Copper alloys are the less expensive option than gold and platinum and provide incomparable heat and thermal performance. Nickel and stainless steel alloys are available and are used widely within the chemical industry.

A selection of our alloys can be found in the table below.

| Stock No. | Description  |
|-----------|--|
| 88322     | Aluminum silicon powder, -325 mesh, 99% (metals basis)                             |
| 45526     | Devarda's alloy, granular  |
| 45547     | Ferrosilicon 75  |
| 12478     | Gallium indium eutectic, 99.99% (metals basis)                                     |
| 18161     | Gallium tin alloy, 99.99% (metals basis)   |
| 40328     | Gold wire, 14kt, red, 1.63mm (0.064in) diam., Au 58.3% min.                        |
| 36683     | Iron nickel powder, -325 mesh, 99.5+% (metals basis)                               |
| 44954     | Nitinol foil, 0.38mm (0.015in) thick, superelastic, flat annealed, pickled surface |
| 41582     | Stainless steel foil, 0.05mm (0.002in) thick, type 304                             |
| 47290     | Stainless steel powder, -325 mesh, type 430-L                                      |

Full product listing and pack sizes available online [www.alfa.com/alloys](http://www.alfa.com/alloys)

## Carbon, graphite and ceramics

Our portfolio includes a wide selection of carbon products in a variety of forms, including powder, diamond, fullerene, glassy carbon and graphite. This product range includes over 350 products.

A selection of our carbon, graphite and ceramic products can be found in the table below.

| Stock No. | Description  |
|-----------|--|
| 31705     | Ceramic Al-23 tube, both ends open (thin wall), outer diam. 5mm, inner diam. 4mm       |
| 39724     | Carbon black, acetylene, 50% compressed, 99.9+%  |
| 43199     | Carbon felt, 3.18mm (0.125in) thick, 99.0%   |
| 43118     | Carbon, activated, -4+8 mesh   |
| 13401     | Diamond powder, synthetic, <1 micron, 99.9% (metals basis)                             |
| 46311     | Fullerene powder, 99% C <sub>60</sub>  |
| 40971     | Fullerene soot, as produced  |
| 44794     | Glassy carbon foam, nominally 500 pores per inch, length 6in, width 6in, thickness 1in |
| 38022     | Glassy carbon plate, 2mm (0.08in) thick, type 2  |
| 37996     | Glassy carbon rod, 1mm (0.04in) diam., type 2  |

Full product listing and pack sizes available online [www.alfa.com/carbon](http://www.alfa.com/carbon)



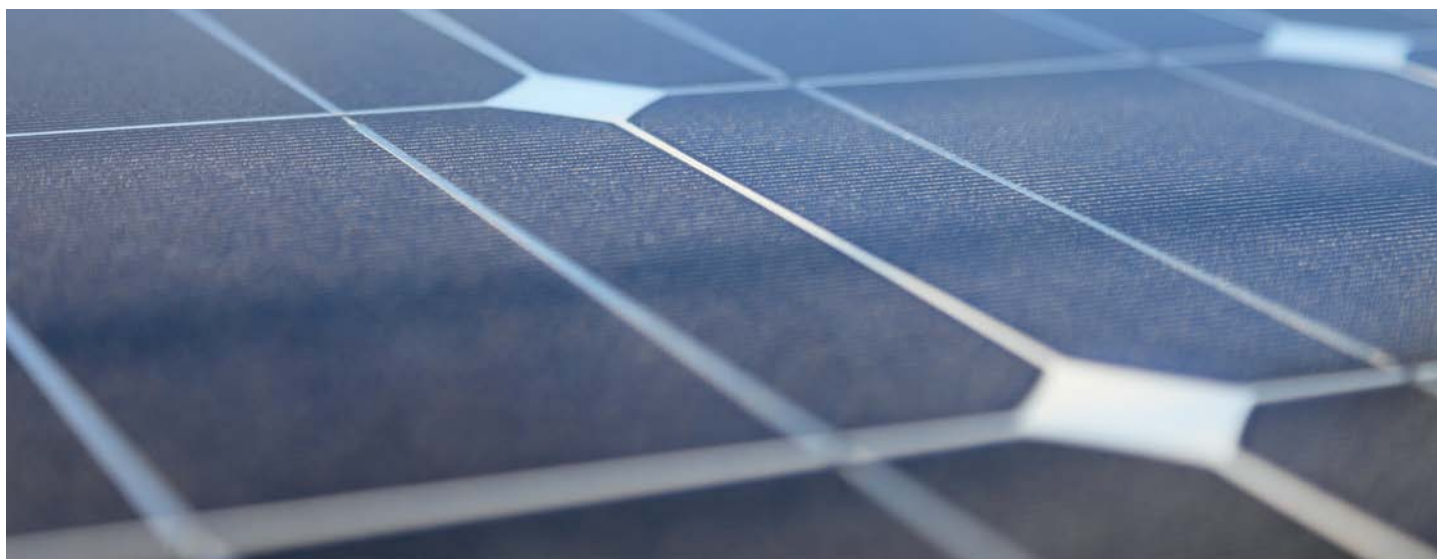
## Fuel cell grade products

Our extensive product line is a great fit for all of your needs. We offer a full range of membrane electrode assemblies, Toray carbon papers, Nafion® membranes, anodes for hydrogen and reformate fuel cells, cathodes for hydrogen and reformate fuel cells, cathodes and anodes for direct methanol fuel cells and fuel cell catalysts.

A selection of our fuel cell grade products can be found in the table below.

| Stock No. | Description  |
|-----------|--|
| 45468     | Copper based methanol reforming catalyst, HiFUEL® R120   |
| 45374     | Direct methanol fuel cell (DMFC) anode, 100cm <sup>2</sup>                                     |
| 42180     | Nafion® N-117 membrane, 0.180mm thick, ≥0.90 meq/g exchange cap.                               |
| 45036     | Nafion® NRE-212 membrane, 0.05mm thick, ≥0.92 meq/g exchange cap.                              |
| 45465     | Nickel based steam reforming catalyst, HiFUEL® R110  |
| 35849     | Platinum, nominally 20% on carbon black, HiSPEC® 3000  |
| 42204     | Platinum, nominally 40% on carbon black, HiSPEC® 4000  |
| 45039     | Platinum, nominally 40%, ruthenium nominally 20% on 50% compressed carbon black, HiSPEC® 10300 |
| 44728     | Platinum, nominally 60% on high surface area advanced carbon support, HiSPEC® 9100             |
| 45365     | Toray carbon paper, PTFE treated, TGP-H-60, 19x19cm  |

Full product listing and pack sizes available online [www.alfa.com/fuel-cell-products](http://www.alfa.com/fuel-cell-products)



## Evaporation materials

Our product line consists of a compiled broad representation of the more commonly used materials for evaporating and crystal growing applications. All purities are based on total metallic impurities unless otherwise specified.

All products designated as Puratronic® or REacton® grade are automatically supplied with a Certificate of Analysis (COA). This certificate details elements sought, detection limits and total metallic impurity levels in parts per million. Purities are based on Total Metallic Impurities (TMI). Tolerances for metal are normally +/- 10% of listed value unless specifically identified.

A selection of our evaporation materials can be found in the table below.

| Stock No. | Description   |
|-----------|---|
| 40830     | Carbon sputtering target, 76.2mm (3.0in) diam. x 3.18mm (0.125in) thick, 99.999% (metals basis)         |
| 39671     | Cobalt slug, 6.35mm (0.25in) diam. x 6.35mm (0.25in) length, 99.95% (metals basis)                      |
| 39675     | Copper slug, 6.35mm (0.25in) diam. x 6.35mm (0.25in) length, 99.996% (metals basis)                     |
| 13394     | Gold slug, 3.175mm (0.125in) diam. x 6.35mm (0.25in) length, Premion®, 99.99% (metals basis)            |
| 13374     | Platinum slug, 6.35mm (0.25in) diam. x 12.7mm (0.50in) length, Premion®, 99.99+% (metals basis)         |
| 40419     | Platinum slug, 6.35mm (0.25in) diam. x 6.35mm (0.25in) length, 99.95% (metals basis)                    |
| 13381     | Rhodium slug, 99.95% (metals basis)   |
| 39670     | Tantalum slug, 6.35mm (0.25in) diam. x 6.35mm (0.25in) length, 99.95% (metals basis)                    |
| 41110     | Titanium nitride sputtering target, 50.8mm (2.0in) diam. x 3.18mm (0.125in) thick, 99.5% (metals basis) |
| 43043     | Titanium sputtering target, 50.8mm (2.0in) diam. x 6.35mm (0.250in) thick, 99.995% (metals basis)       |

Full product listing and pack sizes available online [www.alfa.com/evaporation-materials](http://www.alfa.com/evaporation-materials)



## Labware

Our Labware includes precious metal, non-precious metal, PTFE Labware, quartz, glassy carbon, and ceramic labware. From crucibles to plates, we offer labware in many different forms. We offer over 750 products in our labware and equipment portfolio.

If your need is for precious metal labware, then trust the precious metal experts the next time you need the tolerance of platinum or other precious metal labware. Alfa Aesar labware is competitively priced on a daily basis and standard items are in stock for immediate shipment.

Only a few metals are required to produce a wide array of durable labware. The basic noble metals group consists of platinum, rhodium, ruthenium, osmium, palladium, iridium, gold and silver. Ruthenium and osmium, however, are unworkable in their pure form and are only offered under special circumstances.

A selection of our labware products can be found in the table below.

| Stock No. | Description  |
|-----------|--|
| 35904     | High form nickel crucible, cap 30 ml, top diam. 41 mm, bottom diam. 25mm, depth 43mm   |
| 21236     | Inoculating loop Pt 3.5% Rh, Loop ID 4mm, wire diam. 0.91mm, shank length 75mm, delivery cap. 0.011ml, ID +0.01/-0.06mm        |
| 98123     | Inoculating loop, Pt 3.5% Rh, loop ID 1.45mm, wire diam. 0.41mm, shank length 75mm, delivery cap. 0.001ml, ID +0.01/-0.06mm    |
| 36056     | Low form inconel crucible, cap. 100ml, top diam. 59mm, bottom diam. 50mm, depth 46mm   |
| 35947     | Low form zirconium crucible, cap. 35ml, top diam. 46mm, bottom diam. 38mm, depth 30mm  |
| 46865     | Non-wetting Pt 5% Au crucible, top dia 37.5mm, bottom diam. 22.5mm, Ht 41mm, base thickness 0.30mm, cap. 30ml                  |
| 46988     | Non-wetting Pt 5% Au crucible with RF rim, top diam. 29mm, bottom diam. 17.5mm, Ht 24mm, base thickness 0.25mm, cap. 10ml      |
| 46569     | Platinum Fischer cathode mesh cylinder w/out rings on stem, cyl. diam. 45mm, Ht 45mm, overall Ht 150mm, S.A.125cm <sup>2</sup> |
| 36097     | Straight wall zirconium crucible, cap. 250ml, outside diam. 82mm, depth 59mm   |
| 35992     | Straight wall zirconium crucible, cap. 35ml, outside diam. 46mm, depth 29mm  |

Full product listing and pack sizes available online [www.alfa.com/labware](http://www.alfa.com/labware)



## Interactive periodic table

Use our interactive periodic table to view our complete portfolio of pure elements. Click on chemical symbols to view the full list of products and technical information. Grey tiles indicate products are readily available.

View online [www.alfa.com/pure-elements](http://www.alfa.com/pure-elements)

**Alfa Aesar**  
PRODUCTS • RESOURCES • Search by Product Number, CAS Number or Keyword

**Element Details**  
ALUMINUM ( ${}_{13}\text{Al}^{3+}$ )  
Select a form or compound to view products.

**Element Form**

- Aluminum
- Aluminum foil
- Aluminum flake
- Aluminum sheet
- Aluminum foil
- Aluminum Silicon Alloy
- Aluminum granules
- Aluminum slug
- Aluminum ingot
- Aluminum ingot
- Aluminum lump
- Aluminum sputtering target
- Aluminum hydrogen sulfide
- Aluminum plate
- Aluminum ribbon foil
- Aluminum powder
- Aluminum wire

**Compounds** **Alloys**

**Element Description**  
Pure aluminum is light, non-toxic, nonmagnetic and nonsparking. It can be easily formed, machined, or cast. This silvery-white metal has a high thermal conductivity and has excellent corrosion resistance. Aluminum is the most abundant metal in the earth's crust. It ranks second among metals in the scale of malleability and sixth in ductility.

| Property Name               | Property Value                                | Property Name                          | Property Value                 |
|-----------------------------|---|--|--------------------------------|
| Atomic Code                 | 13  | First Ionization Energy                | 578 kcal/mole                  |
| Cat.#                       | 342505  | Electronegativity                      | 1.5 Pauling's                  |
| Covalent Radius             | 1.18 Angstroms                                | Melting Point @ 20°C                   | 248                            |
| Melting Point               | 933°C   | Linear Coefficient of Expansion @ 20°C | 23.4 x 10 <sup>-6</sup> /°C    |
| Boiling Point               | 2519°C  | Electrical Resistivity @ 20°C          | 2.81 x 10 <sup>-8</sup> ohm-cm |
| Density                     | 2.70 gm/cm <sup>3</sup>                       | Crystal Structure                      | Cubic, FCC                     |
| Thermal Conductivity @ 20°C | 0.53 kcal/cm <sup>2</sup> /m <sup>2</sup> /°C |  |                                |

Glossary of elemental forms available online

Order our products online [www.alfa.com](http://www.alfa.com)