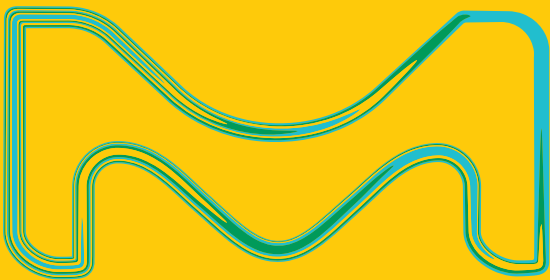


# purification perfection

Quality materials for absorption,  
adsorption & filtration



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Merck KGaA, Darmstadt,  
Germany operates as  
MilliporeSigma in the  
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**Supelco**<sup>®</sup>  
Analytical Products

# purification perfection

Purification is one of the most important applications in analytical laboratories. To ease your daily work, we offer a complete range of absorption and adsorption reagents, as well as filtration and clarification materials – all with excellent take-up properties. Our products are suitable for a wide variety of applications, such as absorbing or binding substances, as well as for decolorization, clarification and filtration. Regardless of the purpose, they deliver quality perfected for your intended use.



# Your benefits:



## Reliability:

All natural products used are tested for organic impurities, and various anions and cations. The products are specified and offer excellent **batch-to-batch consistency**.



## Convenience:

**Comprehensive portfolio** allows successful implementation of a wide variety of purification methods.



## Variety:

Our products are available in **different grades** to meet **individual application requirements**.



## Flexibility:

**Products are available in various pack sizes** to suit all our customers – from small labs to large testing or production facilities.



## Sustainability:

Most of our absorption, adsorption and filtration materials are natural reagents which are **not harmful to the environment**.

## Overview of methods

**Adsorption** [from Latin "adsorbere": to add, to attach] describes the take-up of a substance on the surface of a solid without a chemical reaction. Due to adhesive forces, gaseous, liquid and, in rare cases, solid substances accumulate on the surface or interface of the adsorbent. This releases the bond energy in the form of heat. The larger the surface, the greater the adsorption capacity of a substance. The specific surface (in "m<sup>2</sup>/g") is therefore often given for specification of the adsorbent. Adsorption strength is reduced by warming and increased by cooling.

**Absorption** [from Latin "absorbere": to devour, swallow up] describes a physical or chemical process of taking-up molecules or atoms by solid or liquid materials. This process differs from adsorption as molecules are taken up by the volume, not by the surface.

**Filtration** is a mechanical separation process for purification of substances. The filter and clarification materials used for this are usually reagents with absorbent or adsorbent properties, although materials which work in a similar way to frits or which form capillaries as filter cake, can also be used to clarify solutions, and decolorize or remove solid or colloiddally dissolved substances.

# FROM A TO Z

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adsorption & filtration at a glance

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## Absorption tubes

### Application advice

Drying of incoming or outgoing air or general gas absorption

### Additional information

Absorption tubes are 15 cm long and have a diameter of 2 cm. Hoses of various dimensions can also be connected: hoses with 3 mm external diameter can be pushed into the tube, while hoses with 8–12 cm internal diameter can be pushed over the opening. The tube must be opened on both sides before use by removing the two stoppers.

### Absorption tube for H<sub>2</sub>O Application advice

H<sub>2</sub>O absorption tubes are used to keep reagents or solvents dry, for example during Karl Fischer titration or when working with solvent from withdrawal systems.

### Additional information

In H<sub>2</sub>O absorption tubes, the filling also contains an indicator displaying the degree of saturation.

### Absorption tube for CO<sub>2</sub> Application advice

CO<sub>2</sub> absorption tubes are used to bond carbon dioxide, for example to keep the titer stable during titration with NaOH and to prevent the formation of Na<sub>2</sub>CO<sub>3</sub> through the CO<sub>2</sub> contained in the incoming air. The absorbent, which is placed on an inert carrier, also prevents caking after absorption. The air or gas can still flow through the absorption tube without a change in resistance.

### Additional information

CO<sub>2</sub> absorption tubes are filled with sodium hydroxide on an inert carrier material. The reagent in these absorption tubes has a significantly higher capacity than caustic alkali pellets.

Product	CAS-No.	Content	Packaging	Cat. No.
<b>Absorption tubes</b>				
Absorption tube for H <sub>2</sub> O (molecular sieve 0.3 nm with indicator)	-	3 units	Plastic can	<b>1.06107.0003</b>
Absorption tubes for CO <sub>2</sub> (sodium hydroxide on support)	-	3 units	Plastic can	<b>1.01562.0003</b>



## Aluminium oxide fibers

### Application advice

Due to their high melting point of 1700 to 1800 °C, aluminium oxide fibers are ideal for use as filtration and insulation agents.

### Information on sustainable protection

In contrast to asbestos fibers, our aluminium oxide fibers are non-carcinogenic and can be easily disposed of.

Product	CAS-No.	Content	Packaging	Cat. No.
<b>Aluminium oxide fibers</b>				
Aluminium oxide fibers for gooch crucibles	142844-00-6	100 g	Plastic bottle	<b>1.15754.0100</b>
		1 kg	Plastic bottle	<b>1.15754.1000</b>



## Calcium oxide

### Application advice

Calcium oxide is used as a drying agent and absorbent for CO<sub>2</sub> and for the creation of calcium bonds, e.g. in the production of glass, paper, rubber and soda.

### Information on sustainable protection

Calcium oxide is obtained from selected natural marble.

Product	CAS-No.	Content	Packaging	Cat. No.
<b>Calcium oxide</b>				
Calcium oxide from small marble lumps ~ 3-20 mm	1305-78-8	1 kg	Plastic bottle	<b>1.02109.1000</b>
		25 kg	Fibre carton	<b>1.02109.9025</b>

# Charcoal activated

## Application advice

Activated charcoal is used for a wide range of applications, such as adsorption, decolorization and purification of gases and liquids, and as a carrier for catalysts. Thanks to its very large internal surface area (800-1500 m<sup>2</sup>/g), activated charcoal is able to absorb molecules of diverse sizes. Since chemical substances must diffuse into the pores during adsorption, powdered carbon is easier to 'load'. In contrast, the granulated form offers lower resistance, making it more suitable for flow-through processes with gases.

## Additional information

Activated charcoal is used in many different fields, including the chemical industry or for environmental protection. Activated charcoal looks the same as charcoal, but, due to a special 'activation process', it has a porous, sponge-like structure with a larger internal surface area.

## Information on sustainable protection

Activated Charcoal is gained from natural raw materials.



Product	CAS-No.	Content	Packaging	Cat. No.
<b>Charcoal activated</b>				
Charcoal activated granular 1,5 mm extra pure	7440-44-0	1 kg	Plastic bag	<b>1.02514.1000</b>
		5 kg	Fiber carton	<b>1.02514.5000</b>
		25 kg	Fiber carton	<b>1.02514.9025</b>
Charcoal activated powder pure	7440-44-0	1 kg	Plastic bag	<b>1.02183.1000</b>
		17.5 kg	Fiber carton	<b>1.02183.9018</b>
Charcoal activated powder extra pure	7440-44-0	1 kg	Plastic bag	<b>1.02184.1000</b>
		5 kg	Fiber carton	<b>1.02184.5000</b>
		20 kg	Fiber carton	<b>1.02184.9020</b>
Charcoal activated for analysis	7440-44-0	250 g	Metal can	<b>1.02186.0250</b>
		1 kg	Metal can	<b>1.02186.1000</b>
		20 kg	Fiber carton	<b>1.02186.9020</b>

# Charcoal wood

## Application advice

Charcoal wood can be used for adsorption, filtration or clarification for many technical purposes.

## Additional information

Coking or carbonization of beech wood (heating up to 400 °C without air) produces charcoal wood with a very large internal surface area.

## Information on sustainable protection

Natural production by coking beech wood.

Product	CAS-No.	Content	Packaging	Cat. No.
<b>Charcoal wood</b>				
Charcoal wood powder	7440-44-0	25 kg	Fiber carton	<b>1.02204.9025</b>

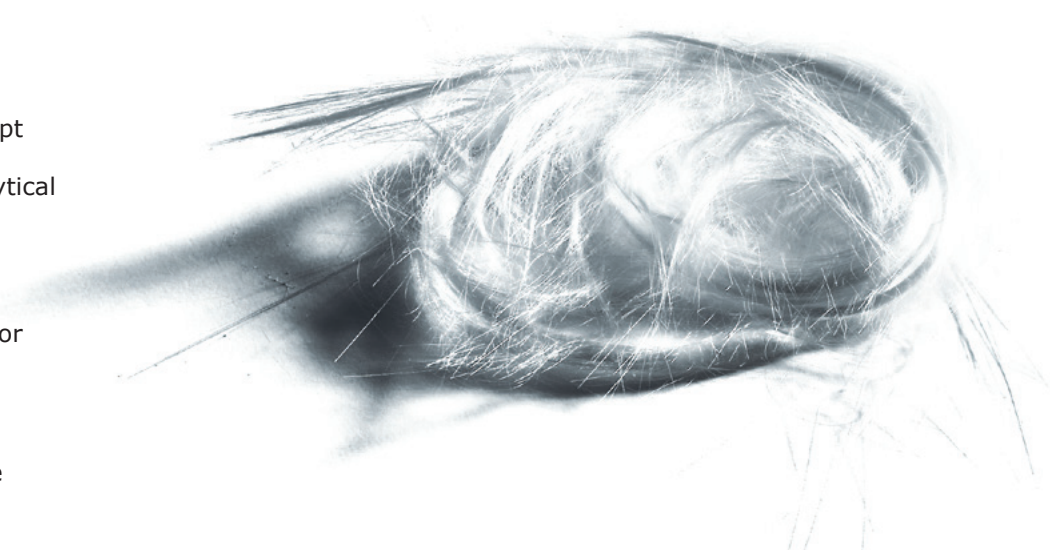
# Glass wool

## Application advice

Due to its chemical resistance even against strong acids (except hydrofluoric acid), glass wool is used as a filter material in analytical processes, and as a supporting substance for drying agents in drying towers, for example to prevent caking in phosphorus pentoxide. It can also be used for insulation up to around 500 °C.

## Additional information

Glass wool is made of soda lime silic acid glass fibers.



Product	CAS-No.	Content	Packaging	Cat. No.
<b>Glass wool</b>				
Glass wool	65997-17-3	250 g	Metal can	<b>1.04086.0250</b>
		1 kg	Fiber carton	<b>1.04086.1000</b>

# Graphite

## Application advice

Graphite is used as an absorbent and lubricant at temperatures of up to around 350 °C.

## Information on sustainable protection

Graphite consists mainly of pure carbon.

Product	CAS-No.	Content	Packaging	Cat. No.
<b>Graphite</b>				
Graphite	7782-42-5	2.5 kg	Fiber carton	<b>1.04206.2500</b>
		25 kg	Fiber carton	<b>1.04206.9025</b>



# Molecular sieves



## Application advice

Molecular sieves can be used in desiccators and drying tubes; for keeping absolute solvents dry; for drying gases or solvents in drying columns; for selective adsorption (e.g. phosgene from chloroform)

## Advantages

- Easy to use: practically chemically inert, non-toxic, easy disposal, dried liquids can be decanted
- High adsorption capacity even with low water content in substance to be dried
- High adsorption capacity even at high temperatures
- High adsorption affinity for polar and unsaturated organic molecules (however, H<sub>2</sub>O is always preferentially adsorbed)
- Selective adsorption: only molecules that can pass through the pores are adsorbed

## Capacity

15–24% at 25 °C

## Indicator

Brown gel indicator changes from brown to yellowish at H<sub>2</sub>O uptake of approximately 7–10 g/100 g molecular sieve

## Regeneration

Maximum regeneration temperature is 450 °C. Molecular sieves can be dried in a drying oven above 250 °C to a water content of 2–3 g/100 g molecular sieve. The remaining water can be removed at 300–350 °C using a vacuum oil pump (10–1–10–3 mbar), whereby a cold trap containing carbon dioxide coolant or liquid air should be connected. Due to their high partial water vapor pressure, water pumps are not suitable for this purpose. For safety reasons, molecular sieves that have been used to dry solvents should be freed from possible solvent by mixing water prior to regeneration. Molecular sieves with a moisture indicator should not be heated above 150 °C.

## Chemical and physical properties

Molecular sieves are crystalline, synthetic zeolites. Their crystal gratings are similar to a cage with numerous hollow spaces. The cavities are accessible from all sides by pores of exactly defined dimensions. Depending on the type of molecular sieve, these can be 0.3, 0.4 or 1.0 nm in diameter. If the water on the hollow spaces is removed due to heating, the material becomes an extremely active absorbent. However, this only occurs with molecules adsorbed that are small enough to pass through the pores (sieve effect).



Pore diameter	Type	Composition	Structure
0.3 nm	3A	Potassium sodium aluminium silicate	Zeolite
0.4 nm	4A	Sodium aluminium silicate	Zeolite
1.0 nm	13A/X	Sodium aluminium silicate	Zeolite

## Physical properties

The molecular sieve crystallites obtained by hydrothermal manufacture are formed into rods and beads using 1–2% clay as binding agent. Vibration caused by transport may bring about some abrasion which collects in the first fraction during dynamic drying.



<b>Bulk density</b>	0.75 kg/l
<b>Surface (BET)</b>	800 m <sup>2</sup> /g
<b>Form supplied</b>	Beads (~2 mm), rods (~1.6 mm)
<b>Effective pore diameter depending on type</b>	0.3, 0.4 or 1.0 nm
<b>Hollow space volume</b>	0.3 cm <sup>3</sup> /g
<b>Specific heat</b>	>0.8 kJ/kg
<b>Heat of absorption per kg adsorbed water</b>	4,200 kJ

Product	CAS-No.	Content	Packaging	Cat. No.
<b>Molecular sieves</b>				
Molecular sieve 0.3 nm beads ~2 mm (suitable for use in Karl Fischer titration)	1318-02-1	250 g	Plastic bottle	<b>1.05704.0250</b>
		1 kg	Plastic bottle	<b>1.05704.1000</b>
		10 kg	Plastic bucket	<b>1.05704.9010</b>
Molecular sieve 0.3 nm beads, with moisture indicator ~2 mm (suitable for use in Karl Fischer titration)	-	250 g	Plastic bottle	<b>1.05734.0250</b>
		1 kg	Plastic bottle	<b>1.05734.1000</b>
Molecular sieve 0.3 nm rods ~1.6 mm (1/16")	1318-02-1	250 g	Plastic bottle	<b>1.05741.0250</b>
		1 kg	Plastic bottle	<b>1.05741.1000</b>
Molecular sieve 0.4 nm beads ~2 mm Reag. Ph Eur	1318-02-1	250 g	Glass bottle	<b>1.05708.0250</b>
		1 kg	Glass bottle	<b>1.05708.1000</b>
		10 kg	Plastic bucket	<b>1.05708.9010</b>
Molecular sieve 0.4 nm beads, with moisture indicator ~2 mm	1318-02-1	250 g	Glass bottle	<b>1.05739.0250</b>
		1 kg	Glass bottle	<b>1.05739.1000</b>
Molecular sieve 0.4 nm rods ~1.6 mm (1/16")	1318-02-1	1 kg	Plastic bottle	<b>1.05743.1000</b>
Molecular sieve 0.5 nm beads ~2 mm	1318-02-1	250 g	Glass bottle	<b>1.05705.0250</b>
		1 kg	Glass bottle	<b>1.05705.1000</b>
Molecular sieve 1.0 nm beads ~2 mm	1318-02-1	1 kg	Glass bottle	<b>1.05703.1000</b>

# Sea sand

## Application advice

Sea sand is used in laboratories to filter and clarify extremely contaminated water or solutions. It is also used as a grinding aid, and to create a heating bath (sand bath). To remove contaminations which can be dissolved in acid, sea sand is boiled in hydrochloric acid and ignited in order to carbonize organic material and achieve the quality required for laboratory use.

## Information on sustainable protection

Sea sand is a natural product which consists predominantly of silicon oxide and small quantities of other metal oxides.



Product	CAS-No.	Content	Packaging	Cat. No.
<b>Sea sand</b>				
Sea sand, extra pure	14808-60-7	1 kg	Plastic bottle	<b>1.07711.1000</b>
		5 kg	Plastic bottle	<b>1.07711.5000</b>
		10 kg	Fiber carton	<b>1.07711.9010</b>
Sea sand, purified by acid and calcined, for analysis	14808-60-7	1 kg	Plastic bottle	<b>1.07712.1000</b>
		5 kg	Plastic bottle	<b>1.07712.5000</b>
		10 kg	Plastic bottle	<b>1.07712.9010</b>
		25 kg	Fiber carton	<b>1.07712.9025</b>

# Sodalime

## Application advice

Soda lime is used to absorb CO<sub>2</sub> from air and gases, offering a large internal surface area for this purpose. It is suitable for small or large absorption systems in laboratories and technical facilities.

## Additional information

Soda lime contains an indicator which changes from beige to violet. The color may change further from violet to blue when in intermittent use or after a period of shutdown. This is due to a back or balance reaction, in which hydroxide groups that have become active again are

available on the surface. However, no CO<sub>2</sub> is released when this occurs. Even if the indicator returns to beige, the soda lime does not have more absorption capacity than at the start, because the CO<sub>2</sub> bonding which has already taken place reduces the remaining capacity available.

Product	CAS-No.	Content	Packaging	Cat. No.
<b>Sodalime</b>				
Sodalime with indicator, granules ca. 1–2.5 mm	-	500 g	Plastic bottle	<b>1.06733.0501</b>
		2.5 kg	Plastic bottle	<b>1.06733.2500</b>
Sodalime pellets with indicator for analysis	-	1 kg	Plastic bottle	<b>1.06839.1001</b>
		5 kg	Plastic bottle	<b>1.06839.5001</b>
		25 kg	Fiber carton	<b>1.06839.9025</b>

# Supelco®

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