

## AGAR

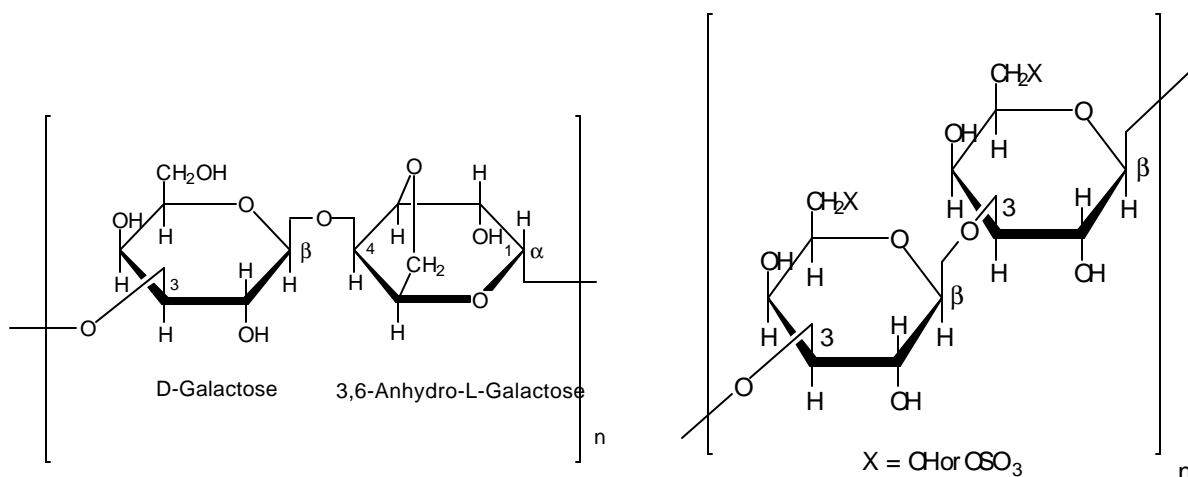


Fig. 1: Agarose

Fig. 2: Agarpectin

CAS NUMBER: 9002-18-0

**SYNONYMS:** Agar-agar; Gum agar; Bacto-agar; Bengal gelatin; Bengal ising glass; Ceylon; Ceylon ising glass; Chinese ising glass; Digenea simplex mucilage; GAM medium; Gelose; Japan agar; Japan ising glass; Kantenmatsu; Laya caran; NCI-C50475; Oxoid III; Oxoid L 11; S 100

**PRODUCT PROPERTIES AND DESCRIPTION:**

Appearance: Light yellow powder with a tan cast  
Molecular weight: N/A

Agar is a polysaccharide complex obtained through bleaching and hot water extraction of agarocytes from the red alga *Rhodophyceae*, found in the Pacific and Indian Oceans and in the Sea of Japan. The genera *Gelidium*, *Acanthopeltis*, *Ceramium*, *Pterocladia* and *Gracilaria* predominate in agar production. Agar is composed of about 70% agarose and 30% agarpectin.<sup>2,3</sup>

**Agarose:** A neutral gelling fraction which consists of a linear polymer of alternating D-galactose and 3,6-anhydrogalactose units (see Figure 1).

**Agarpectin:** A non-gelling fraction which consists of  $\beta$ -1,3-glycosidically linked D-galactose units, some of which are sulfated at position 6 (see Figure 2).

**STABILITY / STORAGE AS SUPPLIED:**

Store at room temperature.

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### SOLUBILITY / SOLUTION STABILITY:

Agar is strongly hydrophilic and can slowly absorb about 20 times its weight of cold water, swelling in the process.<sup>1</sup> Sigma tests the solubility of agar powder in water at 1 mg/ml with boiling, and obtains a clear, colorless solution. Agar is not soluble in alcohol.<sup>3</sup>

### APPLICATIONS:

Agar is used in microbiology and bacteriology to make solid culture media for microorganisms; as an antistaling agent in bakery products, confectionery, meats and poultry; as a gelling agent in cosmetics, desserts and beverages; as a corrosion inhibitor; in sizing for paper and silks; in adhesives; in the dyeing and printing of textiles and fabrics; and as a protective colloid in ice cream, pet foods, health foods, laxatives, pharmaceuticals, dental impressions, lab reagents and photographic emulsions.<sup>1,3</sup>

### OTHER GELLING AGENTS:

**1.) Agarose:** Separate data sheet is available.

**2.) Gelatin:** Separate data sheet is available.

**3.) Phytigel (product number P8169):** Phytigel is an agar substitute produced from a bacterial substrate composed of glucuronic acid, rhamnose and glucose. It produces a clear, colorless, high strength gel which aids in detection of microbial contamination. Phytigel provides an economical alternative to agar as a gelling agent. Originally developed for microbial applications, Phytigel is a good choice in any application (such as plant cell culture) where some agar products tend to inhibit growth due to unidentified impurities. To prevent clumping, Phytigel should be added to rapidly stirring culture medium that is at room temperature.<sup>4</sup>

**4.) Agargel (product number A3301):** Agargel is a blend of agar and Phytigel which was developed to help control vitrification in plant tissue cultures. Agargel provides the positive attributes of agar and Phytigel, is cheaper than agar, and is superior to Phytigel in applications where vitrification is a problem. Agargel produces a semiclear gel which allows for better detection of contamination.<sup>4</sup>

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| PRODUCT | NAME DESCRIPTION   | GELLING TEMP | ~ pH at 1.5% | ASH CONTENT | TYPICAL TRACE ELEMENT* |      |      |      |          |
|---------|--|--------------|--------------|-------------|------------------------|------|------|------|----------|
|         |  |              |              |             | Ca                     | Mg   | K    | P    | Na       |
| A7002   | Agar   | 33-35°C      | 7.0-7.6      | 2-4%        | 0.30                   | 0.10 | 0.01 | 0.01 | 0.50 (%) |
| A6549   | Agar, Type A   | 33-35°C      | 7.0-8.0      | 5-6%        | N/A                    | N/A  | N/A  | N/A  | N/A      |
| A6674   | Agar, Type E   | 33-35°C      | 7.0-7.8      | 3-4%        | 0.02                   | 0.02 | 0.07 | 0.13 | 1.20 (%) |
| A6924   | Agar, High Gel Strength  | 33-35°C      | 7.0-8.3      | 3-4%        | 0.03                   | 0.00 | 0.07 | 0.09 | 0.72 (%) |
| A7049   | Agar, Purified   | 30-35°C      | 6.5-7.5      | ≤2%         | 0.02                   | 0.01 | 0.01 | 0.01 | 0.35 (%) |
| A5306   | Agar Bacteriological<br><b>Molecular Biology Reagent</b><br>A purified agar for which the original, naturally occurring pigments, salts and miscellaneous matter have been reduced to a minimum. <sup>4</sup>  | 33-36°C      | 5.7-7.0      | <6.5%       | 1840                   | 751  | 415  | 60   | 8095 ppm |
| A5431   | Agar, Noble<br><b>Molecular Biology Reagent</b><br>An agar further purified with careful specific washings. Originally designed for use in Noble's cyanide citrate agar. <sup>4</sup>  | 32-39°C      | 5.7-7.2      | <2%         | 432                    | 96   | N/A  | N/A  | 3550 ppm |
| A5054   | Agar<br><b>Molecular Biology Reagent</b><br>Used as a component of culture media for molecular genetics.   | 34-37°C      | 7.1-7.4      | <4%         | N/A                    | N/A  | N/A  | N/A  | N/A      |
| A9915   | Agar<br><b>Cell culture tested</b><br><b>Insect cell culture tested</b>  | 33-35°C      | 7.0-7.6      | 2-4%        | 0.30                   | 0.10 | 0.01 | 0.01 | 0.50 (%) |
| A6686   | Agar<br>Bacteriological, Flake<br><b>Plant cell culture tested</b><br><b>Microbiologically tested</b><br>A purified agar from which the naturally occurring pigments, salts and miscellaneous matter has been reduced to a minimum. Suitable for most bacteriological work. Use at 6-12 g/L. | 32-39°C      | 6.5-7.5      | 3-7%        | 0.17                   | 0.09 | 0.80 | N/A  | 3.10 (%) |

| PRODUCT | NAME DESCRIPTION  | GELLING TEMP | ~ pH at 1.5% | ASH CONTENT | TYPICAL TRACE ELEMENT* |      |      |      |          |
|---------|---|--------------|--------------|-------------|------------------------|------|------|------|----------|
|         |   |              |              |             | Ca                     | Mg   | K    | P    | Na       |
| A1296   | Agar<br>Prepared from A7002<br><b>Plant cell culture tested</b><br><b>Microbiologically tested</b><br><b>Cell Culture tested</b><br>A purified agar for which most research needs. Use at 6-12 g/L. | 32-35°C      | 7.0-7.5      | 2-5%        | 0.30                   | 0.10 | 0.01 | 0.01 | 0.50 (%) |
| A4550   | Agar, Type A<br>Prepared from A6549<br><b>Plant cell culture tested</b><br>General purpose, good bacteriological grade agar. Use at 6-12 g/L.   | 26-28°C      | 7.2-7.7      | 5-6%        | 0.01                   | 0.01 | 0.10 | 0.17 | 1.80 (%) |
| A4675   | Agar, Type E<br>Prepared form A6674<br><b>Plant cell culture tested</b><br>General purpose agar. Use at 5-10 g/L.   | 26-28°C      | 7.5-8.0      | 3-4%        | 0.02                   | 0.02 | 0.07 | 0.13 | 1.20 (%) |
| A4800   | Agar, Type M<br><b>Plant cell culture tested</b><br>General purpose agar. Use at 5-11 g/L.  | 34-36°C      | 7.0-7.5      | 3-6%        | 0.09                   | 0.14 | 0.07 | 0.01 | 1.40 (%) |
| A9799   | Agar, High gel strength<br>Prepared from A6924<br><b>Plant cell culture tested</b><br>Use when firmer gel is required. Use at 4-8 g/L.  | 34-37°C      | 6.5-7.0      | 3-4%        | 0.03                   | 0.00 | 0.07 | 0.09 | 0.72 (%) |
| A7921   | Agar, Purified<br>Prepared from A7049<br><b>Plant cell culture tested</b><br>High purity agar for research and protoplast culture. Use at 6-12 g/L.   | 30-35°C      | 6.5-7.0      | 2.0%        | 0.02                   | 0.01 | 0.01 | 0.01 | 0.35 (%) |
| A8678   | Agar, Washed<br><b>Plant cell culture tested</b>  | 25-27°C      | 7.0-7.5      | 2.2%        | 0.15                   | 0.08 | N/A  | N/A  | 0.38 (%) |

\* Done by ICP (Inductively coupled plasma)

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### NOTE:

The information in the table above is based on supplier data as well as assays performed by Sigma. The values indicated do not necessarily constitute product specifications; rather, these numbers are approximate and should be used as general guidelines when selecting a product.

### REFERENCES:

1. R. J. Lewis, Sr., *Hawley's Condensed Chemical Dictionary*, 12th Ed., p. 27, Van Nostrand Reinhold Co., New York (1993).
2. T. Scott and M. Eagleson, *Concise Encyclopedia: Biochemistry*, 2nd Ed., p. 18, Walter de Gruyter, New York (1988).
3. *Merck Index*, 12th Ed., S. Budavari, Ed., p. 34, # 182 (1996).
4. *Sigma Chemical Co. Plant Culture Catalog*, p. 52 (1996).