Antibiotic Assay Medium A (DM014B)

Intended Use

Antibiotic Assay Medium A (DM014B) is recommended for microbiological assay of β-lactams and other antibiotics in pharmaceutical and food related preparations, in compliance with BP.

Product Summary and Explanation

Antibiotic assay media are prepared according to the specifications of the *USP*[1], European Pharmacopeia[2] and AOAC International.[3] The antibiotic media are identified numerically with names assigned by Grove and Randall in *Assay Methods of Antibiotics*.[4] The activity (potency) of an antibiotic can be demonstrated under suitable conditions by its inhibitory effect on microorganisms.[1] An assay is made to determine the ability of an antibiotic to kill or inhibit the growth of living microorganisms. Biological tests offer the most convenient means of performing an assay,[5] since a reduction in the antimicrobial activity of a specific antibiotic reveals changes not usually displayed by chemical methods.[6] Antibiotic assays are performed by the cylinder plate method and the turbidimetric "tube" assay. The cylinder plate method, first described by Abraham et al.[7] for the assay of penicillin, was later modified by Foster and Woodruff[8] and by Schmidt and Moyer.[9] The choice of methodology is often based on many factors, including relative ease of performance, flexibility and use of automated or semi-automated devices for both identification and susceptibility testing.[10]

This medium is also used as inoculum and maintenance medium for different test organisms for antibiotic assays. Composition of this medium is in accordance with British Pharmacopoeia.[11]

Principles of the Procedure

Antibiotic Assay Medium No A contains combination of peptone, pancreatic digest of casein and beef extract which provides nitrogenous growth factors and other essential growth nutrients. Yeast extract serves as a source of B complex vitamins. Glucose monohydrate in the medium serves as the carbon source for stimulating the growth of the test microorganism. Agar provides excellent medium for antibiotic diffusion and gives well defined zones of inhibition.

Cylinder Plate Assay

This method is based on the diffusion of an antibiotic solution from a cylinder placed on the surface of an inoculated agar medium. After incubation the diameter of a zone of inhibition depends, in part, on the concentration or activity of the antibiotic. This method is used in the assay of commercial preparations of antibiotics, as well as in the quantitative determination of antibiotics in body fluids, animal feeds and other materials.

Prediffusion of antibiotics for 10-20 mins in the agar by incubating at temperature below the optimal growth temperature for microorganism would facilitate better diffusion of antibiotics followed by incubation of plates for microbial growth.

Note:

Recommended for the microbiological assay of Josamycin, Josamycin propionate, Bacitracin zinc.

Formula / Liter

Ingredients	Gms / Liter
Peptone	6.00
Pancreatic digest of casein	4.00
Yeast extract	3.00
Beef extract	1.50
Glucose monohydrate	1.00
Agar	15.00
Final pH: 6.6 ± 0.1 at 25°C	
Formula may be adjusted and/or supplemented as required to meet performance specifications	

Precautions

1. For Laboratory Use only.
2. IRRITANT. Irritating to eyes, respiratory system, and skin.
3. Freshly prepared plates should be used for antibiotic assays.
4. All conditions in the microbiological assay must be controlled carefully.
5. The use of standard culture medium in the test is one of the important steps for obtaining good results.

Directions

1. Suspend 30.5 grams of the medium in one liter of R-water/purified / distilled water.
2. Mix thoroughly and heat to boiling to dissolve the medium completely.
3. Autoclave at 121°C, 15 psi pressure, for 15 minutes / validated cycle.

Quality Control Specifications

Dehydrated Appearance	Cream to yellow homogeneous free flowing powder
Prepared Medium	Yellow coloured slightly opalescent gel forms in Petri plates
Reaction of 3.05% solution	pH 6.6 ± 0.1 at 25°C
Gel Strength	Firm, comparable with 1.5% Agar gel

Growth Promotion Test

As per British Pharmacopoeia

Expected Cultural Response: Cultural characteristics observed after an incubation at specified temperature for 18-24 hours.

Sr. No.	Organisms	Results to be achieved				
		Inoculum (CFU)	Growth	Recovery	Antibiotics Assayed	Incubation Temperature
1.	*Bacillus subtilis ATCC 6633*	50-100	good-luxuriant	>=70%	Josamycin, Josamycin Propionate	35-37°C
2.	*Micrococcus luteus ATCC 10240*	50-100	good-luxuriant	>=70%	Bacitracin zinc (Adjust the pH to 7.0 ± 0.1)	35-39°C
3.	*Micrococcus luteus ATCC 9341*	50-100	good-luxuriant	>=70%	Rifamycin Sulphate	35-39°C

The organisms listed are the minimum that should be used for quality control testing.

Test Procedure

Preparation of Stock cultures

1. Maintain stock cultures on agar slants and make transfers at 1- or 2-week intervals.
2. Using sterile purified water, saline or Antibiotic Medium No. 3, prepare the inoculum for assay by washing growth from a fresh 24-48 hour agar slant and further dilute the culture to obtain the desired organism concentration.
3. For using as a test organism *Bacillus subtilis*, inoculate the organism on Antibiotic Medium No. 1 and incubate at 37°C for 1 week. Wash spores from the agar surface, and heat the spores at 56°C for 30 minutes. Using sterile purified water wash the spores three times, heat again at 65°C for 30 minutes, and then dilute to the optimal concentration. Inoculum prepared following this method should produce a sharp zone in the assay.
4. For preparing spore suspension of *B. Subtilis,* Antibiotic Medium No. 1 modified by the addition of 300 mg manganese sulfate ($MnSO_4 \cdot H_2O$) per liter is used which aids in the sporulation of *B. Subtilis*.

Cylinder Plate Assay

1. Use 20 × 100 mm glass or plastic Petri dishes with sufficient depth so that cylinders used in the assay will not be pushed into the medium by the cover.
2. Use stainless steel or porcelain assay cylinders having the following dimensions (± 0.1 mm): 8 mm outside diameter, 6 mm inside diameter and 10 mm long. Clean the cylinders carefully to remove all residues, using an occasional acid bath (i.e., with approximately 2N nitric acid or with chromic acid).
3. Four or six cylinders are generally used per plate, evenly spaced on a 2.8 cm radius.
4. For assuring accurate assays, use a level surface for working to obtain uniformly thick base and seed layers in the Petri dish.
5. Allow the base layer to solidify and then overlay the seed layer containing a proper concentration of the test organism. The amount of medium in the layers varies for different antibiotics, with most assays specifying a 21 mL base layer and a 4 mL seed layer.
6. In any case, dishes with flat bottoms are required to assure complete coverage of the bottom of the dish when small amounts of base medium are used. Tilt the plate to obtain even coverage of the base layer by the seed layer and allow it to solidify in a level position. Plates should be used the same day as prepared.

Results

1. After incubation the concentration of the antibiotic being assayed is determined by measuring the zone of inhibition obtained, with that of reference standard antibiotic.
2. Refer to appropriate references and specific test procedures.

Storage

Store the sealed bottle containing the dehydrated medium at 2 - 30°C. Once opened and recapped, place container in a low humidity environment at the same storage temperature. Protect from moisture and light.

Expiration

Refer to the expiration date stamped on the container. The dehydrated medium should be discarded if not free flowing, or if the appearance has changed from the original color. Expiry applies to medium in its intact container when stored as directed.

Limitations of the Procedure

1. For identification, organisms must be in pure culture. Morphological, biochemical and/or serological tests should be performed for final identification.
2. Consult appropriate texts for detailed information and recommended procedures.

Packaging

Product Name : Antibiotic Assay Medium A
Product Code : DM014B
Available Pack sizes : 100gm/500gm

References

1. United States Pharmacopeial Convention, Inc. 2008. The United States pharmacopeia 31/The national formulary 26, Supp. 1, 8-1-08, online. United States Pharmacopeial Convention, Inc., Rockville, Md.
2. Council of Europe. 2002. European pharmacopeia, 4th ed. Council of Europe, Strasbourgh, France.
3. Horwitz (ed.). 2007. Official methods of analysis of AOAC International, 18th ed., online. AOAC International, Gaithersburg, Md.
4. Grove and Randall. 1955. Assay methods of antibiotics. Medical Encyclopedia, Inc. New York, N.Y.
5. Pelczar M. J. Jr., Reid R. D., Chan E. C. S., 1977, Microbiology, 4th Edi, Tata McGraw-Hill Publishing Company Ltd, New Delhi.
6. The United States Pharmacopoeia, 2009, The United States Pharmacopoeial Convention,Rockville, MD.
7. Abraham, Chain, Fletcher, Florey, Gardner, Heatley and Jennings. 1941. Lancett *ii*:177.
8. Foster and Woodruff. 1943. J. Bacteriol. *46*:187.
9. Schmidt and Moyer. 1944. J. Bacteriol. *47*:199.
10. Murray P. R., Baron J. H., Pfaller M. A., Jorgensen J. H. and Yolken R. H., (Eds.), 2003, Manual of Clinical Microbiology, 8th Ed., American Society for Microbiology, Washington, D.C.
11. British Pharmacopoeia, 2011, British Pharmacopoeia Commission.

Further Information

For further information please contact your local MICROMASTER Representative.

MICROMASTER LABORATORIES PRIVATE LIMITED
Unit 38/39, Kalpataru Industrial Estate,
Off G.B. Road, Near 'R-Mall' , Thane (W) – 400607. M.S. INDIA.
Ph: +91-22-25895505, 4760, 4681. Cell: 9320126789.
Email: micromaster@micromasterlab.com

DM014BPSS,Rev.00,Ver.00/01.02.2016