WBT511P - Introduction to Biotechnology (Practical)

Spring 2024

Notebook-Activity No. 2

(Practical 4 to 8)

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Due Date: 10-07-2024

Total marks: 20

Question# 1:

Figure (A)

Figure (B)

Figure (C)

Figure (D)

Figure (E)

Figure (F)

Figure (G)

Figure (H)

a) Label the namesof Figure A, B, C, D, E, F, and G shown in the above picture. Write the possible methods used for sterilization of each separately along with principle of that sterilization technique and why it should be used for that particular object (1.5x8= 12 Marks).

Figure A: Petri dishes

Figure B: Test tubes

Figure C: Forceps or tweezers

Figure D: Pipettes

Figure E: Pipette tip boxes

Figure F: Biosafety cabinet or laminar flow hood

Figure G: Buffer solution and culture/growth media

Figure (H) shows membrane filters, also known as filter membranes or syringe filter

These items are commonly used in microbiology and other laboratory settings for various scientific procedures and experiments.

Here are the sterilization methods for each object, along with principles and reasons for use:

1. **Figure A: Petri dishes**

Method: Dry heat sterilization (hot air oven)

Principle: High temperature (160-180°C) for 2-4 hours denatures proteins and oxidizes cell components.

Why: Petri dishes are heat-resistant glass or plastic, suitable for dry heat. This method ensures complete sterilization without leaving residues.

2. **Figure B: Test tubes**

Method: Autoclaving (moist heat sterilization)

Principle: Pressurized steam at 121°C for 15-20 minutes denatures proteins and disrupts cell membranes.

Why: Test tubes can withstand high pressure and temperature. Autoclaving is effective for glassware and reaches all surfaces.

3. **Figure C: Forceps or tweezers**

Method: Flaming with alcohol

Principle: Brief exposure to high heat kills microorganisms instantly.

Why: Quick and convenient for metal instruments used frequently during procedures.

4. **Figure D: Pipettes**

Method: Autoclaving or ethylene oxide gas sterilization

Principle: Autoclaving as above; ethylene oxide alkylates microbial DNA/proteins.

Why: Autoclaving for heat-resistant pipettes; gas sterilization for heat-sensitive ones.

5. **Figure E: Pipette tip boxes**

Method: UV radiation

Principle: UV light damages microbial DNA, preventing replication.

Why: Effective surface sterilization for plastic boxes without heat damage.

6. **Figure F: Biosafety cabinet**

Method: UV light and 70% ethanol wiping

Principle: UV damages microbial DNA; alcohol disrupts cell membranes.

Why: Combines surface disinfection with air sterilization, maintaining sterility.

7. **Figure G: Buffer solution and culture media**

Method: Autoclaving or filtration

Principle: Autoclaving as above; filtration physically removes microorganisms.

Why: Autoclaving for heat-stable solutions; filtration for heat-sensitive ones.

8. **Figure H: Membrane filters**

Method: Gamma irradiation or ethylene oxide gas

Principle: Gamma rays or ethylene oxide damage microbial DNA and proteins.

Why: These methods sterilize without altering the filter structure or pore size.

Each method is chosen based on the material properties, effectiveness, and intended use of the item being sterilized.

b) Write down the name of object shown in Figure H and write its function in the lab. (1+2=3 marks)

The image in Figure (H) shows various types of membrane filters used in laboratory settings. These are specifically syringe filters or disc filters.

Name: Membrane filters (syringe filters/disc filters)

Functions in the lab:

1. **Sterilization**: These filters are used to sterilize liquids by removing microorganisms and particles. This is particularly useful for heat-sensitive solutions that cannot be autoclaved.

2. **Clarification**: They help in removing particulates from solutions, making them clearer for analysis or further use.

3. Sample preparation: In analytical chemistry and microbiology, these filters are used to prepare samples for chromatography, microscopy, or other analytical techniques.

4. Buffer or media filtration: They're used to filter cell culture media or buffers to ensure sterility and remove any precipitates.

5. Protection of analytical instruments: By filtering samples before analysis, these filters help protect sensitive analytical instruments from particulate contamination.

The filters shown have different pore sizes (as indicated by the "PES 0.2µm" label visible on one filter), allowing for selective filtration based on the specific needs of the experiment or procedure.

Question# 2:

a)You have been provided with an overnight growth culture of *E. coli*. Draw a flow sheet diagram showing the steps to wash and harvest the bacterial cells. Also, name the method you can use to calculate the harvested bacterial cells. (4+1= 5 marks)

Submission guidelines

1. This is an in-line submission format.
2. You have to type your answer in the LMS.
3. The copy and paste option is disabled.
4. Once submitted you would not be able to edit it.

Email submission is not allowed in any case.

Notebook answers should be submitted on LMS no later than **(10-07-2024).**
If you have any question please contact via ticketing service.

Good Luck!