

CULTURE MEDIA

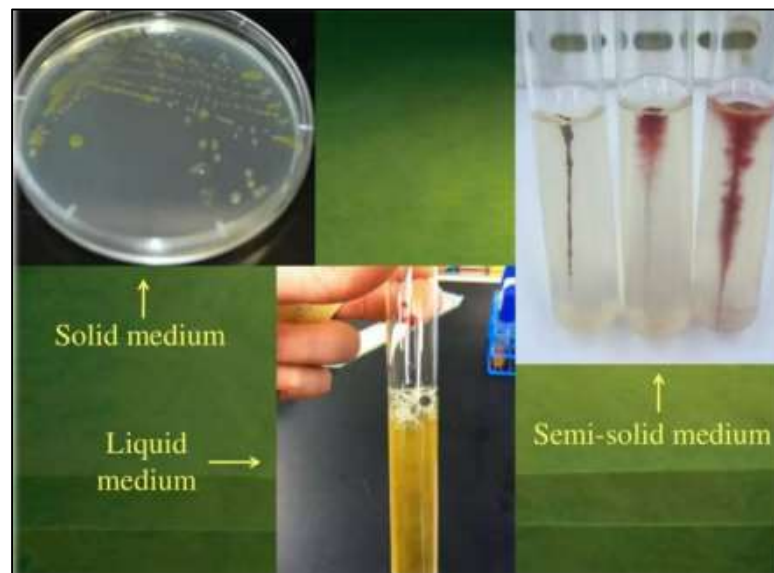
The media is a source of nutrients to support the growth of the microorganisms in-vitro. The media helps in the growth and counting of microbial cells, selection of microorganisms, and survival of microorganisms. The culture medium can be liquid or gel.

Common ingredients of culture media

- **Peptone**- source of carbon and nitrogen.
- **Beef extract**- source of amino acid, vitamins, minerals.
- **Yeast extract**- source of vitamin, carbon, nitrogen.
- **Distilled water**
- **Agar**- solidifying agent.

Types of culture media based on consistency/ physical state:

1. Solid medium
2. Semi-solid medium
3. Liquid medium



1. **Solid Media:** It is for the isolation of bacteria as a pure culture on a solid medium. Agar is used to hardening the media at 1.5- 2.0% concentration. Solid media allows the growth of bacteria as colonies by streaking on the medium. It

solidified at 37 degrees Celsius. Colonies identification is done on this medium.

Examples: Nutrient agar, MacConkey agar, Blood agar, Chocolate agar.

- 2. Semi-Solid Media:** This media shows the motility of bacteria and the cultivation of microaerophilic bacteria. This media has agar at a concentration of 0.5% or less. It has a jelly consistency. The growth of bacteria in semi-solid appears as a thick line in the medium.

Examples: Stuart's and Amies media, Mannitol motility media.

- 3. Liquid Media:** This media shows the growth of a large number of bacteria. It is called Broth that allows bacteria to grow uniformly with turbidity. The growth occurs at 37°C in an incubator for 24hrs. Liquid media don't have the addition of agar; it is for fermentation studies. Growth of bacteria in liquid media- Turbidity is seen at the end of the broth.

Examples: Nutrient broth, Tryptic soy broth, phenol red carbohydrate broth.

Types of culture media based on nutritional factors:

- 1. Simple media 2. Synthetic media 3. Complex media**

- 1. Simple Media:** Simple culture media includes nutrient broth. One percent meat extract and peptone water makes up such broth. Nutrient broth becomes glucose broth when glucose is added to it. Likewise, it becomes nutrient agar when 2-3% agar is added. For purposes of diagnosis, this is the simplest and most common media used in laboratories.

Examples – peptone water, nutrient agar and glucose broth.

- 2. Complex Media:** Complex media contain additional components for bringing out specific qualities or providing the unique nutrients needed for the bacterium's growth. Often needed chemical requirement for particular microorganisms are unknown.

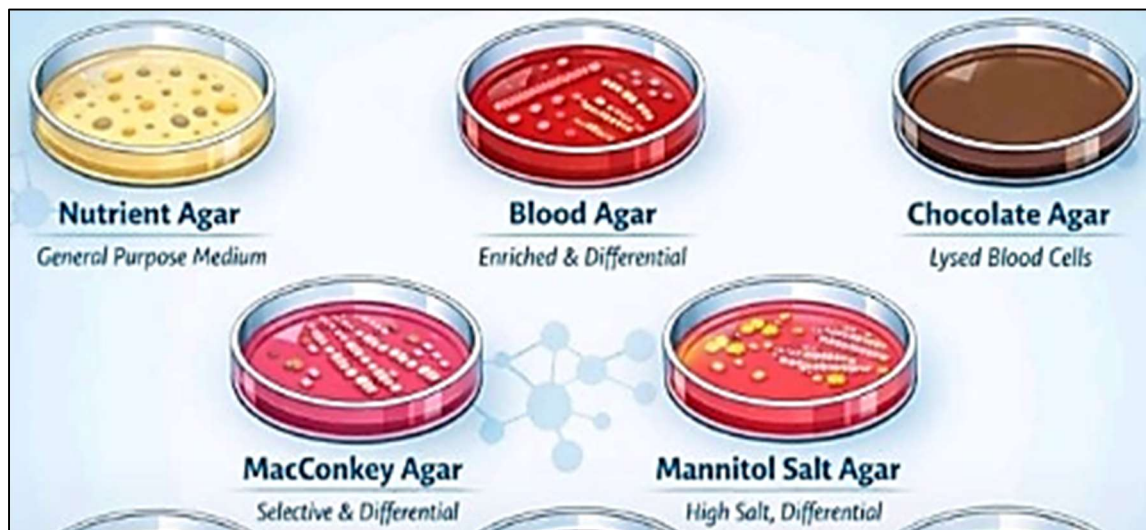
Examples – MacConkey agar medium and chocolate agar.

- 3. Synthetic Media:** A synthetic medium is a defined medium. It is a medium in which there is no yeast, plant or animal tissue present, and all the chemicals employed are known. These are made from only pure ingredients whose exact composition is known.

Example: Peptone water – 1% peptone + 0.5% NaCl in water.

Types of Culture Media based on Chemical Composition:

- 1. Basal media**
- 2. Enriched media**
- 3. Selective media**
- 4. Enrichment media**
- 5. Indicator media**
- 6. Transport media**



- 1. Basal Media:** This media is simple as it enhances the growth of many microorganisms. It's a routinely used medium in the lab, having Carbon and Nitrogen. This media allows the growth; of non- fastidious bacteria without any enrichment source; used for sub-culturing. It's a non-selective medium.

Staphylococcus and *Enterobacteriaceae* grow in this media.

Examples: Nutrient Agar, Peptone water.

- 2. Enriched Media:** This media requires the addition of other substances like blood, egg, or serum. An enriched media allows the growth of devised

microorganisms but inhibits other and fastidious microbes grow as they require nutrients like vitamins and growth-promoting substances.

Examples: Blood agar, Chocolate agar, Blood agar identifies hemolytic bacteria, chocolate media for *N. gonorrhea*.

3. **Selective Media:** As by name, we can tell, this media shows the growth of selective; microbes or desired microorganisms and inhibits the growth of unwanted microbes. The inhibition occurs by adding bile salts, antibiotics, dyes, PH adjustments. Media is agar-based; any media is possible to transform into selective by adding inhibitory agar.

Examples: MacConkey Agar- It has bile salts that inhibit the growth of gram-positive bacteria. Selective isolation for *Enterobacteriaceae*.

4. **Enrichment Media:** It is a liquid medium, which also permits the growth of desired bacteria at a low density. The media provides an environment and conditions as selective media and inhibits unwanted bacteria from growing. It is for the isolation of the soil and fecal microorganisms.

Examples: Selenite F-broth does the isolation of *Salmonella* Typhi from a fecal sample.

5. **Indicator or Differential Media:** This media shows visible changes due to the presence of an indicator. It differentiates bacteria based on colony color growing on the same plate; biochemical characteristics show organism's growth with chemical indicators like neutral red, phenol red, methylene blue.

Examples: Mannitol salt agar (mannitol fermentation shows yellow color colonies)

- Blood agar is used to differentiate between hemolytic and non-hemolytic.
- MacConkey agar produces pink colonies due to lactose utilization and, non-lactose shows pale color colonies.

6. Transport Media: The media transport specimens after collection to control the overgrowth of organisms. For the cultivation, this media act as temporary storage. It also maintains the viability of pathogens in the specimen and prevents them from drying.

Examples: Stuart's transport medium (lacks carbon, nitrogen, growth factors). Pikes medium helps to transport streptococci from throat patients.