

Difference Between Blood Agar and MacConkey Agar

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Key Difference - Blood Agar vs MacConkey Agar

Microbes require sufficient amounts of nutrients and suitable growth conditions for their optimal growth. Based on the requirement, culture media can be designed and prepared by targeting a specific type of microorganism or a specific category. A culture medium is defined as a solid or liquid preparation designed to support the growth of microorganisms. A wide variety of culture media is available to isolate and identify microorganisms in laboratories. Selective media, differential media, nutritive media and enrichment media are several categories. Blood agar and MacConkey agar are two different media which belong to the category of differential media. The key difference between blood agar and MacConkey agar is that **blood agar is an enriched differential medium used to isolate fastidious microorganisms and detect their hemolytic activity whereas MacConkey agar is a selective and differential medium used to differentiate between non-fastidious gram-negative bacteria from gram-positive bacteria.**

What is Blood Agar?

Blood agar is a nutritive differential medium that supports the growth of a wide range of fastidious microorganisms. It is considered as a non-selective medium since it allows the growth of most organisms. Blood is enriched with nutrients. Hence, blood agar supports the growth of fastidious microorganisms which are not easy to grow in culture media. Blood agar has the differential property due to its hemolysis property. This medium can detect the destruction of [erythrocytes](#) by growing [bacteria](#). The complete breakdown of the red blood cells (beta (β) hemolysis) is recognized by the clear zones developed around the bacterial colonies. Partial destruction of the RBCs (alpha (α) hemolysis) can be recognized by the development of a greenish brown color on the agar medium. Gamma (γ) hemolysis is recognized when bacterial growth does not change the medium and does not destruct the red blood cells.

Composition of Blood Agar Medium - One Liter

Ingredients	Amount
Peptone	5 g
Beef extract/yeast extract	3 g
Sodium chloride	5 g
Sheep's blood	50 ml
Agar	15 g
pH	7.2 – 7.6



Figure 01: Blood Agar Plate

What is Macconkey Agar?

MacConkey agar is a selective and differential medium designed to isolate and identify [gram-negative bacteria](#) while suppressing the growth of gram-positive bacteria. MacConkey agar medium has both selective and differential properties. It supports the growth of gram-negative bacteria. It also provides differentiation between gram-negative bacteria by giving different growth characteristics to the medium. Selectivity is given by two components in the medium: bile salts and

crystal violet. Differentiation is given by another two components named [lactose](#) and neutral red indicator. Due to this dual action, MacConkey agar medium has a wide variety of applications in medical and environmental settings.



Figure 02: MacConkey Agar

Bile salts and crystal violet dye act as inhibitors for most gram-positive bacteria. Thus, this medium allows only gram-negative bacteria to grow and show visible colonies. Lactose differentiates lactose fermenting bacteria from non-fermenters. When lactose fermenters (lactose positive) utilize lactose, they release acids to the medium. It lowers the pH of the agar medium and results in red or pink colored colonies. Non-fermenter (lactose negative) bacterial colonies appear in white or are colorless in the medium.

Composition of MacConkey Agar Medium - One Liter

Ingredients	Amount
Peptone (Pancreatic digest of gelatin)	17 g
Proteose peptone (meat and casein)	3 g
Lactose monohydrate	10 g
Bile salts	1.5 g
Sodium chloride	5 g
Neutral red	0.03 g

Crystal Violet	0.001 g
Agar	13.5 g

What is the difference between Blood Agar and Macconkey Agar?

Blood Agar vs Macconkey Agar	
Blood agar is a culture medium designed to grow a wide range of fastidious microorganisms and detect their hemolytic activities.	MacConkey agar is a culture medium designed to isolate gram-negative bacteria and differentiate lactose fermenters from non-fermenters.
Composition	
Blood agar contains peptone, beef extract or yeast extract, sodium chloride, agar, sheep's blood and water.	MacConkey agar contains peptone, proteose peptone, lactose, bile salts, crystal violet, sodium chloride, neutral red, agar, and water.
Properties	
Blood agar shows enriched and differential properties.	MacConkey agar shows selective and differential properties.
Uses	
Blood agar is used to grow fastidious bacteria and differentiate different hemolytic actions of bacteria.	This is used to isolate gram-negative bacteria, differentiate lactose fermenting bacteria and non-fermenting bacteria and isolate coliform and intestinal pathogens in water, dairy and biological specimens.

Summary - Blood Agar vs MacConkey Agar

Blood agar and MacConkey agar are two different differential media used to cultivate microorganisms. MacConkey agar is used to select gram-negative bacteria and differentiate lactose fermenting bacteria from non-fermenting bacteria. Blood agar is enriched with blood nutrients. Hence it is used to grow fastidious bacteria and differentiate them according to their hemolytic patterns. This is the difference between blood agar and MacConkey agar.

References:

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Image Courtesy:

1. "Streptococcal hemolysis" By Y tambe - Y tambe's file ([CC BY-SA 3.0](#)) via [Commons Wikimedia](#)
2. "MacConkey agar with LF and LF colonies" By Medimicro - Own work (Public Domain) via [Commons Wikimedia](#)

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