

Identification of Bacteria. Lactose Fermentation Test: Bacterial Growth on MacConkey, EMB and Carman[©] Agars

Introduction

Various bacteria ferment lactose as you observed in the Methyl Red Test experiment. Besides utilizing methyl red medium to determine the presence of lactose fermenting bacteria, one may also utilize MacConkey (MAC), EMB (eosin-methylene blue) and Carman agars[©]. The first two media indicate the growth of these kinds of bacteria in two separate manners: the growth of lactose fermenters on EMB agar is noted by observing the greenish-metallic sheen on the surface of the bacterial colonies. The growth of lactose fermenters on MAC is noted by the presence of creamy-pink colored colonies.

Carman agar[©] is a little different – it is a modified form of MAC agar – there are those people who are color blind to reds or who have difficulty seeing pink on pink. Carman agar[©] shows creamy yellow colonies growing on a bright purple background if the bacterium ferments lactose to assist those with the color difficulties. The indicator is bromocresol purple.

The beauty of using either medium is that MOST gram positive bacteria are inhibited from growing by having dyes present in each medium. These media, then, are considered differential media. Some examples of gram negative enteric bacteria and their MAC and EMB reactions are shown in Table 1.

Genus	EMB Reaction	Carman Agar [©] (MAC) Reaction
<i>Citrobacter</i>	Greenish-metallic sheen (Slow)	Creamy-yellow (pink) colonies (Slow)
<i>Enterobacter</i>	Greenish-metallic sheen	Creamy-yellow (pink) colonies
<i>Escherichia</i>	Greenish-metallic sheen	Creamy-yellow (pink) colonies
<i>Klebsiella</i>	Greenish-metallic sheen	Creamy-yellow (pink) colonies
<i>Proteus</i>	NEGATIVE	Purple (clear) colonies
<i>Providencia</i>	Greenish-metallic sheen (Slow)	Creamy-yellow (pink) colonies (Slow)
<i>Salmonella</i>	NEGATIVE	Purple (clear) colonies
<i>Serratia</i>	Greenish-metallic sheen (Slow)	Creamy-yellow (pink) colonies (Slow)
<i>Bacillus</i>	NEGATIVE	Purple (clear) colonies
<i>Shigella</i>	NEGATIVE	Purple (clear) colonies

Table 1. Carman[©] (MAC) and EMB reactions of several enteric bacteria.

The purpose of this experiment is to learn how to perform and interpret the EMB and Carman[©] (MAC) reactions for various bacteria on solid media.

Materials and Methods

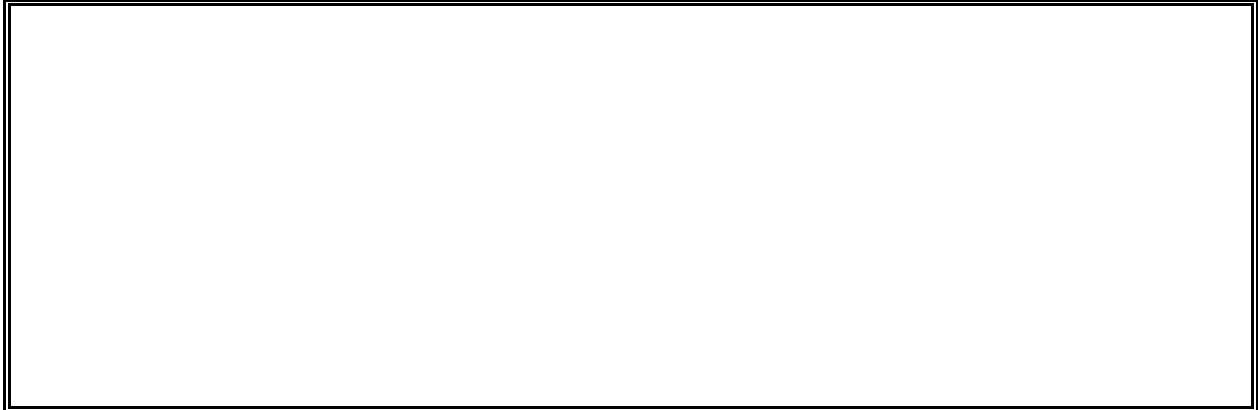
Materials

Carman [©] (MAC) and EMB-media	Loop	Bunsen burner and striker
Incubator	Paper Towels	Disinfectant

Method

Aseptically streak your two media with one of the assigned bacteria. Incubate for 48 hours. Interpret this experiment at your next lab period. How do these results compare with the table above?

Draw and label your observations for your bacteria below:



REFERENCES

1. Beishir, L.: **Microbiology in Practice: A Self-Instructional Laboratory Course, Fifth Edition.** (Harper Collins: New York) 1991.
2. Claus, G.W.: **Understanding Microbes: A Laboratory Textbook for Microbiology.** W.H. Freeman and Co.: New York) ©1989.
3. Jawetz, E., *et al*: **Medical Microbiology, Eighteenth Edition.** (Appleton and Lange: San Mateo) ©1989.
4. _____: **Difco Manual: Dehydrated Culture Media and Reagents for Microbiology, Tenth Edition.** (Difco Laboratories: Detroit) ©1984.