

Background Information

Bacteria and other microbes are considerably difficult to identify. Bacteria are extremely small and show only a few variations in appearance. Testing for chemical characteristics is often needed to distinguish between bacteria that are similar in appearance. The table below gives characteristics for a variety of bacteria that often need to be identified in medical laboratories.

Familiarize yourself with the table. A plus sign in the table indicates that an organism does have the listed characteristic. A minus sign in the table indicates that the bacterium does not have the characteristic. A blank means that the information is not available.

Procedure

- Use the information in the table to identify two unknown organisms described on the next page.

Organism	Shape or Form	Type of Cell Wall	Capsule	Flagella	Endospore	Aerobic	Causes Lysis of Red Blood Cells	Grow Well at 20 C	Sugars Fermented		
									Glucose	Maltose	Lactose
1. <i>Bacillus anthracis</i>	Bacillus	A	+	-	+	+	-	-	+	+	+
2. <i>Bacillus subtilis</i>	Bacillus	A	-	-	+	+	-	+	+	+	+
3. <i>Clostridium botulinum</i>	Bacillus	A	-	+	+	-	+	-	+		-
4. <i>Clostridium tetani</i>	Bacillus	A	-	+	+	-	+	-	-		-
5. <i>Diplococcus pneumoniae</i>	Diplococcus	A	+	-	-	+	+	-			
6. <i>Escherichia coli</i>	Bacillus	B	-	-	-	+	-	-	+	+	+
7. <i>Klebsiella pneumoniae</i>	Bacillus	B	+	-	-	+	-	-	+	+	+
8. <i>Neisseria catarrhalis</i>	Diplococcus	B	-	-	-	+	-	+	+	+	-
9. <i>Neisseria gonorrhoeae</i>	Diplococcus	B	-	-	-	+	-	-	+	-	-
10. <i>Neisseria meningitidis</i>	Diplococcus	B	-	-	-	+	-	-	-	-	-
11. <i>Pseudomonas aeruginosa</i>	Bacillus	B	-	+	-	+	-	+	-	-	-
12. <i>Salmonella typhi</i>	Bacillus	B	-	+	-	+		-	+	+	-
13. <i>Serratia marcescens</i>	Bacillus	B	-	+	-	+		+	+	+	-
14. <i>Staphylococcus aureus</i>	Staphylococcus	A	-	-	-	+	+	-	+		
15. <i>Staphylococcus epidermidis</i>	Staphylococcus	A	-	-	-	+	-	-	+		
16. <i>Staphylococcus fecalis</i>	Staphylococcus	A	-	-	-	+	-	-	+		
17. <i>Staphylococcus hemolyticus</i>	Staphylococcus	A	-	-	-	+	+	-	+		

1. **Unknown A** is examined under a microscope and observed to be a diplococcus. A test is done that shows that the diplococcus has cell wall type B and has no capsule. Samples of unknown A are placed in incubators at 20°C and at 37°C. The sample at 37°C grows well, but the one at 20°C does not. The unknown organism is tested for the ability to ferment the sugars glucose, maltose, and lactose. It can only ferment glucose.

The identity of **Unknown A** is _____ .

2. **Unknown B** is a bacillus with cell wall type A. It is anaerobic and causes lysis (bursting) of red blood cells. This organism is tested for the ability to ferment the sugars glucose and lactose. It cannot ferment either of these sugars.

The identity of **Unknown B** is _____ .

3. **Unknown C** is a bacillus with cell wall type B. It is aerobic and does not produce a capsule. This organism is tested for the ability to ferment the sugars glucose, maltose, and lactose. It is capable of fermenting all of them.

The identity of **Unknown C** is _____ .

4. **Unknown D** is a bacillus with cell wall type B. It moves with flagella and is aerobic. Samples of unknown D are placed in incubators at 20°C and at 37°C. The sample grows well at room temperature. This organism can ferment glucose and maltose but not lactose.

The identity of **Unknown D** is _____ .

5. *Escherichia coli* is a Gram-negative bacteria. Would *Bacillus subtilis* Gram stain purple or pink?

6. Which bacteria are capable of protecting themselves from harsh conditions in their environment by forming an endospore?

7. Respiration in bacteria, humans, and all other organisms serves the same general purpose. What is the main substance produced during cellular respiration that all organisms must have or they will die?

8. Define the following terms as they relate to the respiration process of bacteria:

a) obligate anaerobe -

b) facultative anaerobe -

c) obligate aerobe -