

Urease Activity

Some bacteria are able to produce an enzyme called **urease** that attacks the nitrogen and carbon bond in amide compounds such as urea, forming the end products ammonia, CO₂, and water (Fig. 6-91, p. 79-80 of the Atlas).

Urease activity (the **urease test**) is detected by growing bacteria in a medium containing urea and using a pH indicator such as phenol red. When urea is hydrolyzed, ammonia accumulates in the medium and makes it alkaline. This increase in pH causes the indicator to change from orange-red to deep pink or purplish red (cerise) and is a positive test for urea hydrolysis (Fig. 6-92, p. 79-80 of the Atlas). Failure of a deep pink color to develop is a negative test.

This same test is used in clinical specimens to detect the presence of the pathogen *Helicobacter pylori* the causative agent of stomach ulcers. To survive in the highly acidic stomach lining, *Helicobacter pylori* has a very active urease enzyme. The alkaline ammonia that is released as one of the enzymatic products helps raise the pH of the stomach (~ pH 1-2) to a level that can be tolerated by the bacterium. For *Helicobacter pylori*, urease is a virulence factor since it contributes to the ability of the organism to colonize the stomach lining and cause disease (peptic ulcers).

Procedure:

Period 1

Using aseptic technique, inoculate each test organism onto separate urea agar slants. Label each of the tubes clearly indicating the type of medium and the organism along with your group or table identification and date. Incubate the tubes at 35 °C for 24-48 hours.

Period 2

Examine each slant for growth and for any color change. It is useful to compare the incubated tubes to an uninoculated control tube. The formation of a bright pink color (alkaline pH) indicates that the organism has urease activity.