**Introductory Medical Microbiology**

**Laboratory Notes**

**BIOL 2161L**

**OXYGEN REQUIREMENTS AND GROWTH OBSERVATIONS**

Oxygen is a universal component of cells and is always provided in large amounts by H2O. However, prokaryotes display a wide range of responses to molecular oxygen O2 (Figure 1).

**Obligate aerobes** require O2 for growth; they use O2 as a final electron acceptor in aerobic respiration. Growth will be restricted to the very top of the broth and often form a film or cap.

**Facultative anaerobes** are organisms that can switch between aerobic and anaerobic types of metabolism. Under anaerobic conditions (no O2) they grow by fermentation or anaerobic respiration, but in the presence of O2 they switch to aerobic respiration.

**Aerotolerant anaerobes** are bacteria with an exclusively anaerobic (fermentative) type of metabolism but they are insensitive to the presence of O2. They live by fermentation alone whether or not O2 is present in their environment.

**Obligate anaerobe**s do not need or use O2 as a nutrient. In fact, O2 is a toxic substance, which either kills or inhibits their growth.

**Microaerophiles** need oxygen because they cannot ferment or respire anaerobically. However, they are poisoned by high concentrations of oxygen found at normal atmospheric levels. They gather in the upper part of the test tube but not the very top.

**Figure 1: Observations of Growth Patterns**

Growth through-out broth but greatest at surface

Growth below the surface

Growth only at bottom

**Microaerophile**

**Obligate anaerobe**

**Aerotolerant anaerobe**

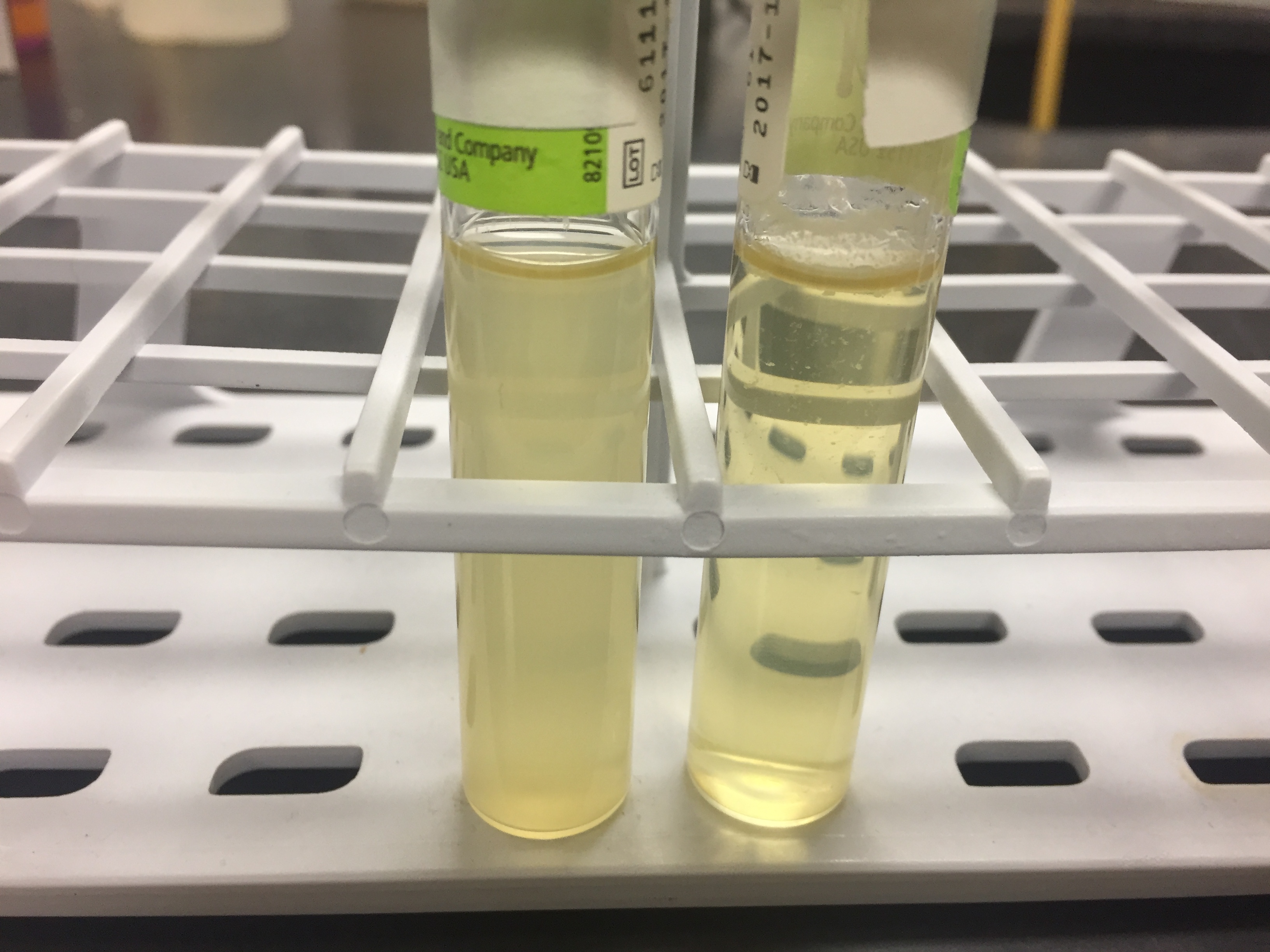
**Facultative anaerobe**

**Obligate aerobe**

Surface growth

Growth through-out broth

**Figure 2: Turbidity**



**Obligate aerobe**

**Facultative anaerobe**