Bacterial growth rates essay sample

1. Mediums that could be used to determine shigellosis include Btilliant Green Agar, and Triple Sugar-Iron Agar. Expected results in a confirmed case of shigellosis are as follows: Brilliant Green Agar – Isolated Shigella colonies which do not ferment lactose or sucrose and appear red or white in color with no growth to trace growth on the Agar plate will be present. Triple Sugar-Iron Agar – Presence of Shigella will manifest as a red slant with a yellow butt with no H2S present. In Brilliant Green Agar, E. coli O157 would present as isolated yellow to greenish colonies surrounded by yellow-green zones. In the Triple Sugar-Iron Agar, E. coli O157 will manifest as a red slant, red butt indicating no change and no sugar fermented. These growth results and their marked differences would allow for distinguishing between E. coli and shigellosis (Black, 2012).

2. To separate a mixed culture of S. aureus, S. epidermidis, and P. aeruginosa into three pure cultures, the following procedure should be used: a)Make an isolation plate by diluting the mixed culture until the individual organisms become separated or far enough apart on the agar surface to be distinguished. This will form visible colonies of each organism which will be isolated from the other colonies present. b)Flame the inoculation loop before each transfer to avoid contamination. c)Using the inoculation loop, aseptically “ pick off” the individual colonies on the isolation plate and transfer to new sterile medium.

Perform this step for each of the three colonies being isolated, taking care to flame the inoculating loop between each transfer. d)Incubate the isolated culture plates which will cause all organisms in the new culture to be descendants of the same organism, therefore providing 3 pure cultures, each

of which will contain one of the organisms listed above. This procedure can be done by utilizing the streak plate method of isolation or the pour plate method of isolation. Streak plating microorganisms is the most common and widely accepted method used for obtaining pure cultures of bacterial colonies (Pollack, Findlay, Mondscheim, & Modesto, 2012).

3. These results suggest that the K. brevis counts are significantly increasing by more than quadrupling in number over a three day time frame, which is indicative of an impending harmful algal bloom. With this rate of increase, it is safe to speculate that a full algal bloom will occur in approximately 2. 5 more days. There are other methods that may be used to investigate growth rates of bacteria, and these include filtration, measuring turbidity with a colorimeter or spectrophotometer, and using the most probable number method (Reikowski, 2013). 4. When beginning a culture of S. pneumonia with one cell at 9 a. m., the amount of cells that will be present by noon is equal to 64 cells. If you were to begin this experiment by 6: 30 p. m., 20 generations will have passed (60 minutes x 10 hours = 600. 600 / 20 generations = 30 minute generation time.)

If this culture is left indefinitely, logarithmic growth will only be maintained for a limited time. This is a result of the increase in the number of organisms and a decrease in nutrients, accumulation of metabolic waste, limited living space, and oxygen depletion. Limiting factor for logarithmic growth is the rate of which energy can be produced in the form of ATP. As nutrient availability decreases, cells are less able to generate ATP and their growth rate significantly decreases. This decreased growth rate results in a leveling off of the growth curve which is followed by the stationary phase unless fresh

medium is introduced or the organisms are transferred to a fresh medium (Kaiser, 2012). 5. In my opinion, using a 1: 10, 000 dilution factor is best to perform this plate count. This allows for a very clear picture of the colonies to be counted. When doing so, the findings are as follows: This year – 13 colonies counted.

Last year – 3 colonies counted.
This year – 130, 000 organisms per ml present.
Last year – 30, 000 organisms per ml present.
These findings suggest potential variances in the ph levels of the water as well as possible variations and changes in water temperature, oxygen levels, hydrostatic pressure, and/or osmotic pressure. The findings also suggest a potential change in the nutrient components of the water which has allowed specific types of bacteria to flourish. These can all be a result of improper aeration in the water and the presence of decaying debris such as plants, fish, and other organic matter. Many of these decaying components are usually digested by aerobic bacteria. When water becomes stagnant however, the water temperature is affected causing water warmed by the sun to remain at the surface while cooler, denser water stays at the bottom where it receives no oxygen.

Inorganic matter then sinks to the bottom where the only breakdown and digestion that occurs is done by anaerobic bacteria which are slower at breaking down these materials and produce foul smelling odors as a byproduct. These odors can include rotten-egg like hydrogen sulfide, methane, and ammonia. The odor can also potentially be caused by odor producing algae such as cyanobacteria or chara algae. This can cause algal

blooms which will in turn affect the clarity of the water and make the pond appear dirty. Therefore, the results of the plate count suggest a large presence of one or more of these bacteria or algae which are directly contributing to the foul odor and reduction in water clarity (Galbreath-O’Leary, 2009).