

Effect of bleach on bacterial growth



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Abstract

Household chlorine bleach is used as disinfectant and sterilizing agent for various purposes in our daily life due to its bactericidal properties. The purpose of the study is to estimate the growth of inhibition of *Escherichia coli* in the presence of different dilution of Clorox solution. ToxTrak™ toxicity test was the best method used for this study and toxicity of the controls and samples was recorded using spectrophotometer at 603 nm wavelength. The initial and final absorbance values give the percent of inhibition of bacterial growth in the samples and control. Variability in the color change in the control and samples from blue to pink gives the extent of growth of inhibition of *E. coli* bacteria. From this study we can conclude that household chlorine bleach have bactericidal properties and can be used for various useful purposes in our daily life. As household chlorine bleach consists of low levels of chlorine it is recommended that not to mix with other bleaching or cleaning agents as it becomes more toxic and causes severe health problems to humans and animals.

Introduction

In our daily life we use several cleaning agents to wash clothes, and for cleaning many surface areas in house. All the washing detergents and cleaning agents consists of low levels of chlorine that can be used as disinfect and sterilizing agent. The purpose of the experiment is to test the toxicity of household chlorine bleach (Clorox) on regular occurring bacteria *Escherichia coli* grown in lauryl tryptose growth medium. Household chlorine bleach consists 3-6% of sodium hypochlorite and oxygen bleach. Due to chlorine bleach's bactericidal abilities it is used as a disinfectant and

sterilizing agent (www.wikipedia.org). Chlorine was proven to be toxic when ingested; it causes gastro intestinal damage or corrosive tissue damage due to its corrosive nature. According to EPA, exposure to chlorine even in small amounts can be harmful to living organisms (Heather, N., 2010).

This experiment focuses on a method called ToxTrak™ toxicity test to identify the inhibitory effect of chlorine on E. coli based on color change. The test tubes are added with reagents contained in a reagent pillow and an accelerator solution to increase the rate of the reaction, so that we need not wait for long hours. A visible color change depicts the activity of the test compound on E. coli. The difference in the initial and final absorbance recorded using a spectrophotometer derives the inhibition percentage (Toxtrak Toxicity test, lab handout). This test identifies the potentiality of compound chlorine as a disinfectant or toxicant to microorganisms and it is estimated that chlorine bleach would inhibit the growth of E. coli.

Materials and Methods

Clorox was brought from Wal-Mart (Troy, Al), toxtrak testing kit (accelerator solution, reagent pillows and test tubes), lauryl tryptose broth was brought from HACH chemical company (Loveland, CO). One day old E. coli in a lauryl tryptose broth, pipettes, deionized water and spectrophotometer are the required materials. The test tubes were labeled. The blank (only deionized water) and control was prepared, the control has all the reagents except the sample chlorine. Different concentrations (100%, 10%, 1%) of chlorine were prepared by serial dilution. Equal amounts of reagent pillows (2), E. Coli sample (1ml), and accelerator solution (4drops) were added in the sample

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test tubes. The blank was kept in the spectrophotometer at 603 nm wavelength, absorbance was made to zero and the readings of control and samples were taken. The reading of the control has to be taken until it reaches 0.06 abs. After 30 minutes, final readings were taken and the initial and final absorbances of the samples and control were used to calculate the percentage of inhibition (Toxtrak Toxicity test, lab handout).

Results

A significant change in color was observed in a very short span of time which indicates active inhibition of bacteria for chlorine. The color was changed from blue to pink. The percentage inhibition was calculated by finding the ratio between the sample and control. For this initially it is required to find the difference between initial and final concentration of each sample.

Discussion

The color of control and samples were changed from blue to pink. Reduction of redox-active dye, resazurin by the bacterial respiration was the basis for the toxtrack method. The color of control and samples were changed from blue to pink when resazurin was reduced. The result shows decrease in the growth of E. coli from sample 1 to 3. But reading of sample 2 shows a negative inhibition than expected inhibition may due to error in preparation of sample 2. Control shows 0% inhibition growth due to absence of E. coli bacteria. Variability in the color change from blue to pink gives the extent of growth of inhibition of E. coli bacteria.

Conclusion

The purpose of this study is to estimate the percent of inhibition of bacterial growth upon using household chlorine bleach. Toxtrack toxicity test was used for this study as it is inexpensive and takes less time. From this study we can conclude that there is a significant reduction in the growth of E. coli by using along with Clorox solution. This study shows that household chlorine bleach (Clorox) has bactericidal properties and can be used as disinfectant and sterilizing agent for various purposes in our daily life. It is recommended that not to mix household chlorine bleach with other bleaching or cleaning agents as it cause serious health problems to human health and animals (Chlorine Bleach and Mold Clean Up, www.spore-tech.com).