TeX and LaTeX

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Abstract

We present Markov processes.

1 Intro

Stochastic processes are chains of random events. You can model these processes over time using Markov chain. there are many applications to this.

1. We can model a worm moving through a petri dish over each successive interval of time.

2. Model the movement of a drug particle inside a cell; see how long it takes to reach the drug target, and what path it takes.

3. Model the growth of a population of bacteria. Each one can produce offspring and the number of individuals grow exponentially over time.

2 Procedures and Observations

2.1 Quantification of Orthophosphate

Preparation of Charles River water Sample
River from the Charles river was collected in 300mL BOD bottles that were previously rinsed with 10% dilute HCl solution and dried. After the water samples were collected they were stored in a refigerator while being allowed to settle. After the water was allowed to settle, 10.0 mL of the water was pipetted into three separate small bottles.

Preparation of Color Developing Solutions (by TA)
The TAs prepared the color developing solutions for the colorimetric assay. The color developing solution was prepared by mixing 2.6M sulfuric acid with ammonium molybdate, potassium antimonyl-tartrate ($C_8H_4K_2O_12Sb_2 \times 3H_2O$), ascorbic acid.

Preparation of 10% HCl solution (by TA)

Prepartion of Primary Standard Solution (by TA)

To prepare the *phosphate working standard solution*, a biological 1.00mL adjustable pipette was used to transfer 1.0mL of the TA's Primary Standard solution $(1x10^{-3}M)$ to a 100mL volumetric flask previously rinsed with 10% HCl solution and Milli-Q water. Milli-Q water was added afterwards to fill the flask up to the 100mL mark.

Preparation of Diluted Phosphate Standards from Stock Working Solution
11 50mL beakers were set up for the assay. Seven of the beakers were used for the diluted phosphate standards. For these seven beakers, phosphate working stock solution was mixed with Milli-Q water in different ratios (see table 1).

Volume of KH_2PO_4 stock	Volume of Milli-Q H_2O to Add	Final PO_4^{3-} concentration
0.00 mL	10.00 mL	A: 0.00 μM
0.50 mL	9.50 mL	B: 0.50 μM
1.00 mL	9.00 mL	C: 1.00 μM
2.00 mL	8.00 mL	D: 2.00 μM
4.00 mL	6.00 mL	E: 4.00 μM
6.00 mL	4.00 mL	F: 6.00 μM
8.00 mL	2.00 mL	G: 8.00 μM

Table 1: Table of relative amounts of KH_2PO_4 and Milli-Q water in each standard solution.

References