

GHB Detection Device

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Introduction

- Gamma hydroxybutyric acid (GHB) is a chemical that has been used in drug-facilitated assault
- We propose a detection method that can alert the individual of a contamination that can serve as an early warning signal
- Sodium polyacrylate spheres are saturated in water, and their osmotic properties are manipulated to alter the size for detection purposes

Prototype Design

Cup Design

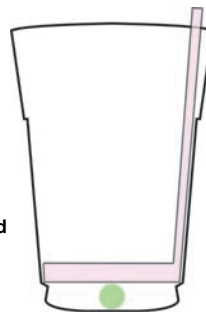
- Sodium polyacrylate spheres act as plugs on the bottom of the cup and the spheres shrink when exposed to added sodium (pseudo - GHB)

Boat Design

- Sodium polyacrylate spheres encased on the bottom of PDMS discs
- Spheres shrink when exposed to sodium concentration and the PDMS disk sinks

Disk-Slit Design

- An acrylic disk with a linear slit holds down the sphere at the bottom
- Spheres shrink when exposed to sodium concentration and the spheres float up

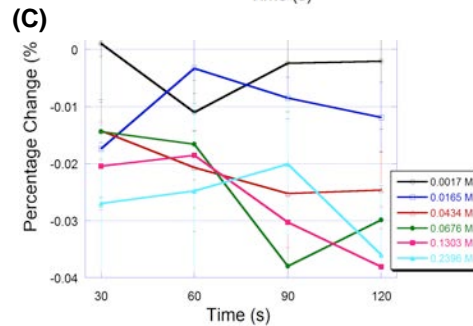
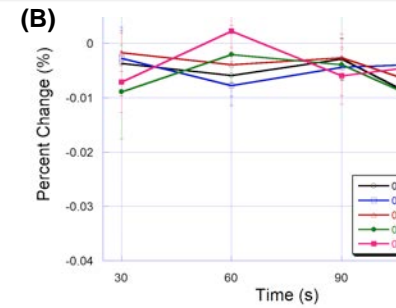
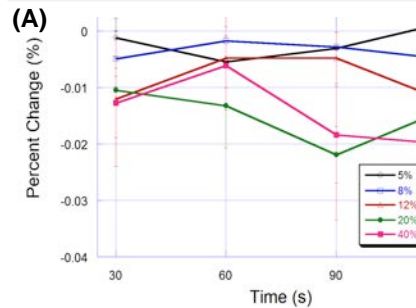


Aerial view

Side view

Results

Determination of Sodium Polyacrylate Sphere Shrinkage



- The graphs represent the percent change in sphere diameters in varying concentrations of solvents

(A) Ethanol

(B) Glucose

(C) Sodium

- No significant size change is detected in all solvents

Beer Saturated Spheres

- Experiments with spheres saturated in beer showed minimal diameter changes
- Grubbs test was conducted for any outliers

Initial Size	Final Size	% Difference
8.69	8.7	0.01
8.63	8.41	-0.22
8.54	8.57	0.03
8.55	8.45	-0.1

Table1. Beer saturated sphere size changes (in mm) in beer after 2 dosages of salt and 60 seconds

Conclusions & Future Directions

Conclusions

- Since spheres decrease in size in greater sodium concentrations, it's advised to first equilibrate the spheres in drinks like Bloody Mary and Margarita to detect any additional sodium ions from spiked NaGHB
- Sphere diameters do not significantly change in ethanol and sugar solutions, which allows for this detection method to be functional in beverages containing alcohol and sugar

Future Directions

- Preliminary experiments suggests that spheres work in a water saturated system, but needs further improvements for complex drinks
- Need to further explore changing the surface chemistry of the spheres to optimize the interaction

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