

14. INVENT YOURSELF: CHEMICAL OSCILLATORS

Team Croatia

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PROBLEM TEXT

Study the cycle time* and its variation when changing the reactants concentration and the temperature in both the traffic light experiment and the blue bottle experiment.

*cycle time = elapsed time from the moment I started shaking the solution to the moment when it gets back to its original state.

the reaction is **incorrectly** classified as a **chemical oscillators**

-> problem missed

MAIN CON

Why these reactions are not chemical oscillators?

Chemical oscillator are reactions that exhibit periodic changes (chemical oscillators are *damped oscillators* -> the state of the system is not restored)

Traffic light/Blue bottle

- dependent on turbulence
- no periodic changes
- the state of the system is restored

THE SOLUTION - THEORY

Pros:

- explained colour change
- formulas behind reactions

Cons:

- said that chemical oscillators never reach equilibrium - false!
- BUT not the reason behind it
- no theoretical base for hypotheses or source
- no explained ratios
 - molar?

THE SOLUTION - EXPERIMENT

Cons:

Pros:

- divided experiment-2
- provided a lot of pictures and videos

- shaking by hand - human error
 - no explanation of ratios
 - lacking control?
 - repetitions not shown
 - said it occurs slower
 - BUT never quantitatively shown
 - complete duration?
- showed average but never error bars
- how do we know the relevancy of her repetitions?

THE SOLUTION - RESULTS AND CONCLUSION

Pros:

graphical results of 2 cycles
-clear patterns

explained chemistry behind results

Cons:

- repetitions not shown
- said it occurs slower
 - BUT never quantitatively shown
 - complete duration?

showed average but never error bars -
how do we know the relevancy of her repetitions?

- ***coloring equally distributed?***
 - ***only looked at subjectively***
 - ***never measured***

POINTS FOR DISCUSSION

- number of oscillations - blue bottle experiment
- kinetical energy?
- shaking control?
- color measuring
- temperature control
- Temperatures below 0 degrees celsius and their effect?

THANK YOU!

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