



2. Slow Match

REPORT

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Problem to be investigated

A cord in which the flame front propagates with a **constant low speed** has been important to ignite cannons. **Produce** such cords and **investigate** their **burn rates** and other properties.



Contents

- HISTORY AND THEORY
- HYPOTHESIS
- EXPERIMENT
- RESULTS
- CONCLUSION
- REFERENCES



HISTORY

The slow match was used by musketeers in the past and for a small period of time, this was the only way of firing a cannon or a gun. However, nowadays it has been replaced by quick match and punk, which are commonly used for igniting fireworks. The firing of a gun isn't triggered by such a mechanism anymore.



THEORY

What is a slow match?

A slow match is a cord that, after chemical treatment, is burning slowly but with a standard desired speed. It mustn't be affected by weather conditions, either these are wind, rain, snow etc.



HYPOTHESIS

From my experience I think that the variables that affect the burn rate of the slow match will be:

- 1.the time letting the cordon to absorb the chemical solution
- 2.the density of the solution
- 3.the way we dry the cordon (vertically-horizontally)



EXPERIMENT

In the experiment I used the following materials:

- Cotton cord
- Lemon
- Vinegar
- Water
- Potassium nitrate (I used this material, though it is possible to make a slow match with other materials too, like sodium nitrate and lead acetate)
- Lighter



EXPERIMENT

Variables

- Time of drying
- Time of absorbing the solution
- Density of solution
- Type of solvent in the solution
- Way of drying the cordon

Constants

- Material of the cord
- Length of the cord
- Place
- Temperature
- Weather



EXPERIMENT



EXPERIMENT



RESULTS

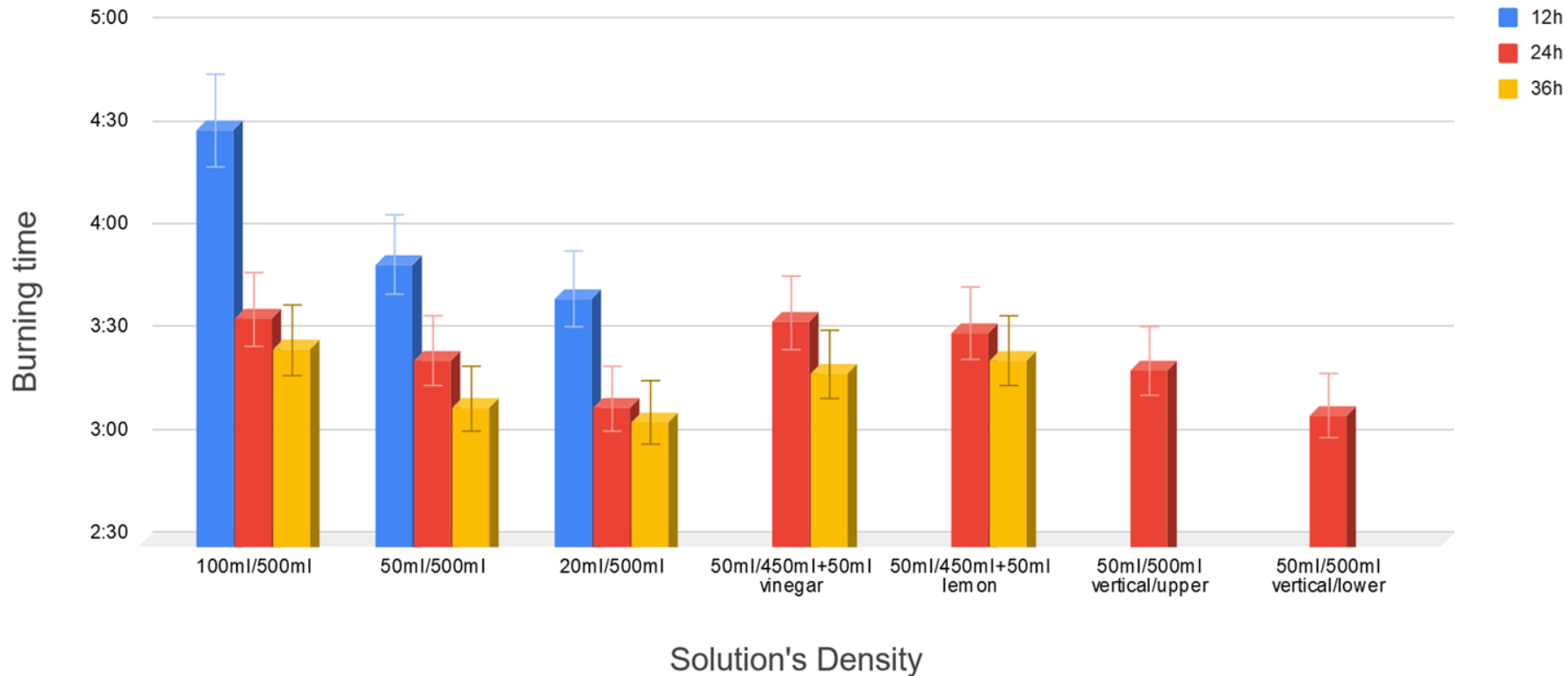
1st Experiment (2 days)	5 cm slow match		
	12h	24h	36h
100ml/500ml	4:30	3:35	3:26
50ml/500ml	3:51	3:23	3:09
20ml/500ml	3:41	3:09	3:05
50ml/450ml+50ml vinegar		3:34	3:19
50ml/450ml+50ml lemon		3:31	3:23
50ml/500ml vertical/upper		3:20	
50ml/500ml vertical/lower		3:07	

2nd Experiment (7 days)	5 cm slow match		
	12h	24h	36h
100ml/500ml	4:22	3:28	3:19
50ml/500ml	3:44	3:20	3:02
20ml/500ml	3:00	2:55	2:42
50ml/450ml+50ml vinegar		3:22	2:50
50ml/450ml+50ml lemon		3:33	2:58
50ml/500ml vertical/upper		3:15	
50ml/500ml vertical/lower		2:45	



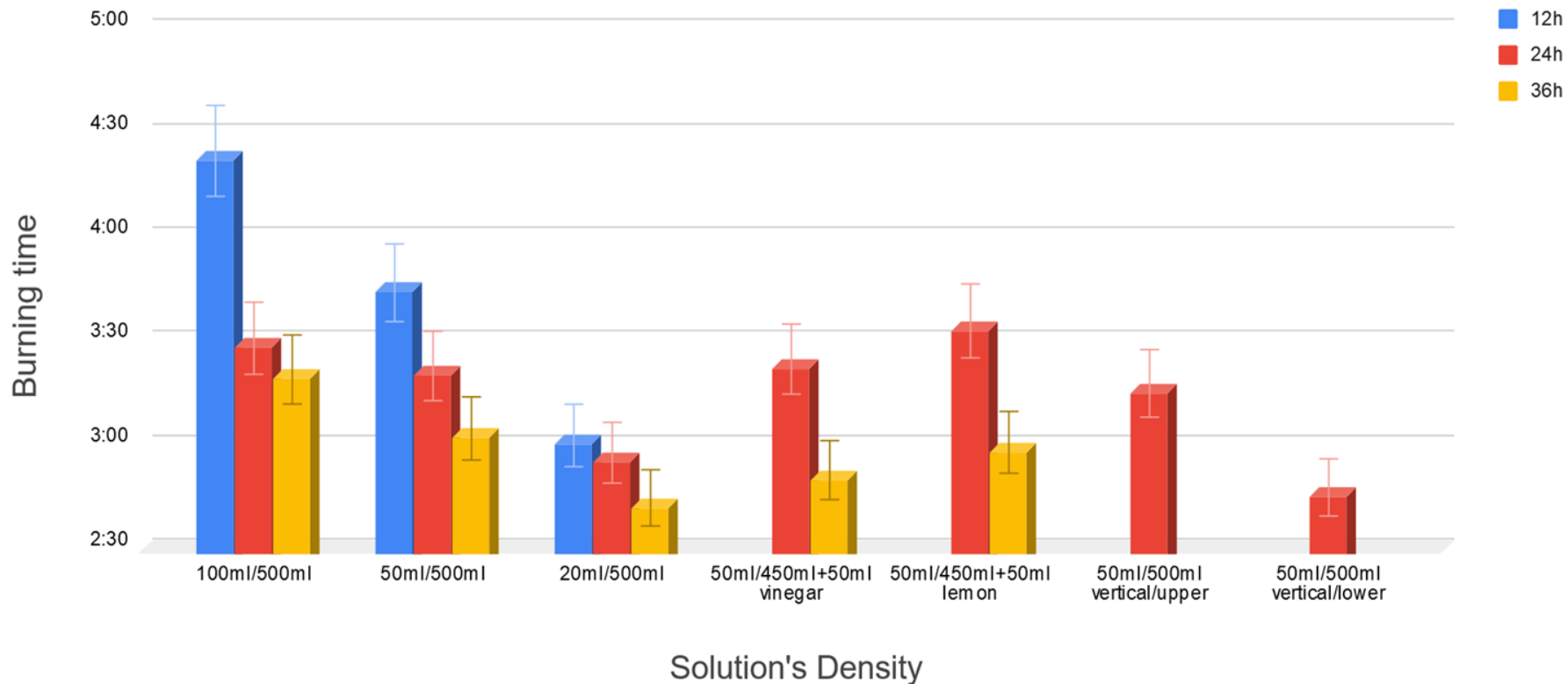
RESULTS

1st EXPERIMENT



RESULTS

2nd EXPERIMENT



CONCLUSION

What I have concluded from my experiment is:

- The type of solvent affects just a little the result
- The more potassium the slower the burn rate will be
- The more time the cordon absorbs the solution the faster it is burned
- Drying the cordon vertically results at unstable burn rate
- The more time the slow match is left to dry the faster it is burned
- Although in both of these experiments it was a bit windy the matches kept burning.



REFERENCES

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THANK YOU FOR YOUR ATTENTION!

