

An Ice Pack Maintaining Coldness

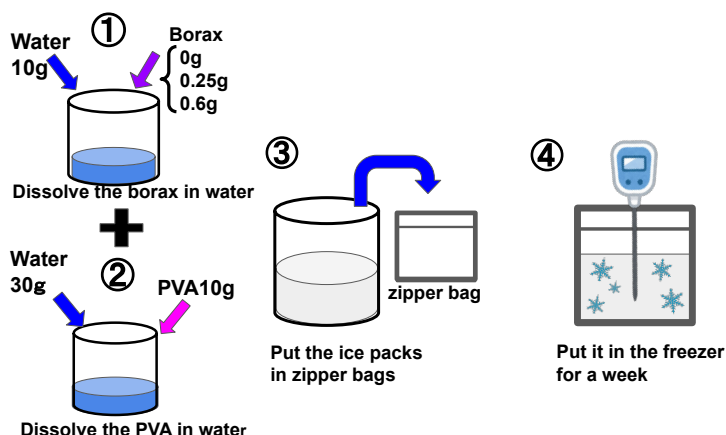


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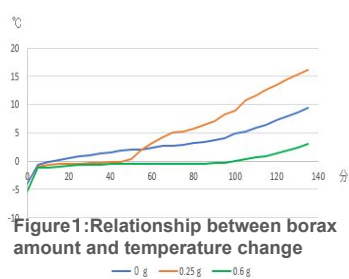
Purpose

Check whether the borax contained in the ice pack is related to its coldness.

Experiment1 Comparison by Borax amount



(1)Results・Considerations



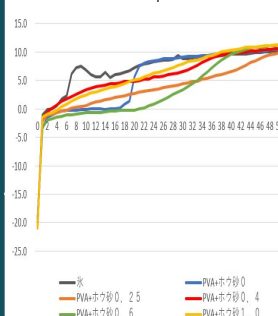
- 【Results】**
- The highest coldness → Borax 0.6g
 - Borax 0.25g
 - Sudden temperature rise
- 【Considerations】**
- Borax 0.25g
 - Cross-linked bridge is weak



(2)Results・Consideration

Inside

	Melting start time	Melting end time	Time taken to melt	Slope of the temperature rise after melting (°C/min)
Water	9	16	7	0.105
Borax0	9	16	7	0.219
Borax0.25	6.71	10	3.29	3.290
Borax0.4	2.87	4	1.13	0.211
Borax0.6	21	23	2	0.453
Borax1.0	4.4	6	1.6	0.246



【Results】

- The lowest temperature → Borax0.6g
- Sudden temperature rise → Borax0.25g

【Considerations】

- High concentration
- The dissolution time is the shortest
- Borax 0.6g
- The melting start time is late
- Borax 0.25g
- Sudden temperature rise

Outside

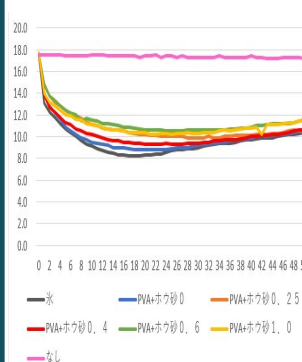
	Temperature decreasing period		Temperature fixing period			Temperature increasing period
	Decreasing period (min)	Downward slope (°C/min)	Average temperature	Standard deviation	minute (min)	
water	15	-0.43	8.3	0.053	6	0.069
Borax0	17	-0.36	8.8	0.044	8	0.065
Borax0.25	23	-0.22	10	0.051	13	0.043
Borax0.4	18	-0.30	9.3	0.052	12	0.060
Borax0.6	20	-0.22	11	0.045	15	0.055
Borax1.0	26	-0.16	10	0.053	7	0.063

【Results】

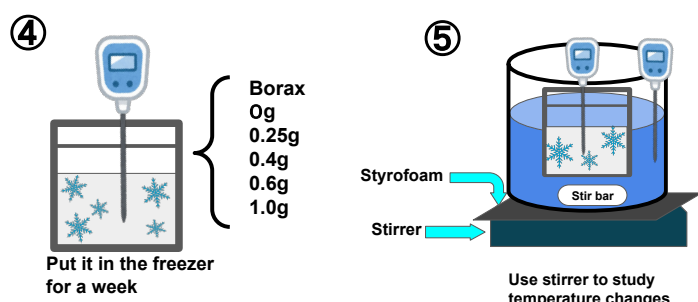
- Borax 0g / Ice
- The temperature decreases suddenly and drops to a low temperature, but the time period is short
- Borax 0.25g / 0.4g / 0.6g
- Slow temperature decreases, the temperature is not so low, but time period is long
- Borax 1.0g
- Slow temperature decreases, temperature is not so low, and time period is short

【Considerations】

- The more free water there is, the lower the temperature will be
- If the thermal conductivity is high, the temperature will drop rapidly
- If the gel is stable, the period will be longer



Experiment2 Comparison by water temperature



Prospects

- Improve reproducibility
- Measure stirrer heat generation
- See if the number of refreezes is related to temperature changes

References

食用以外の塩の利用方法に関する検討—飲料容器等にフィットする保冷材について 海水総合研究所 papers_14_16-21.pdf (shiojigyo.com) view.2025.10.15. apers_1p4_16-21.pdf (shiojigyo.com)

スライムの化学構造に関する一考察 福島県立福島高等学校サイエンス探究 クラス化学班スライムグループ https://www.pref.fukushima.lg.jp/img/kyouiku/attachment/903131.pdf view.2025.10.15.

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