

CONFERENCE PROCEEDING

Correlation Between Potato And Salinity : Investigating The Myth In The Internet

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ABSTRACT

Current work focuses on investigating the rumours or myths saying that adding potatoes would be able to fix an oversalted dish, particularly soups. Based on our survey on the internet, there are various sources and blogs reporting yes and no. And the test they carried did not carry proper scientific and empirical methods. In this study, we carried out the experiment to test and find out if potatoes would be able to cause any effect on salinity through salt solution. With proper volume and mass measurement, salinity refractometer to record the salinity properly, and proper experimentation, we believe the rumours can be answered accordingly. The results showed that boiled potatoes immersed into salt solution (8%) indeed were able to reduce salinity up to 20 %. The potatoes did not act as an adsorbent, but functioned as water carriers allowing diffusion of salt ions from the concentrated solution into the less concentrated water region carried by the potatoes. In this abstract, we detailed out the methodology and further interpretation of the results.

Keywords: *Potato, salinity, salt concentration, myth*

INTRODUCTION

The popularity of cooking and the active spreading of information has brought around many tips, tricks on ways you could improve a dish. Namely, the trick where potatoes or *Solanum Tuberosum* are used to reduce the salinity of an oversalted dish. There were many attempts to debunk this method however this study is the first discussion on the topic done in an empirical and scientific manner. This study aims to not only identify the correlation of potatoes and the salt content of a dish but also uncover the scientific explanation behind it.

METHODOLOGY

The study was done by executing two sets of experiments. For both sets of experiments, The salt solution was prepared by mixing NaCl (table salt) into an amount of water. The raw materials, which were potatoes, were cut into cubes with a calculated mass of approximately 50 g. The potatoes were put in 150ml salt solutions and were left to soak at room temperature. After 24 hours, the potatoes were carefully removed. The volume of the solution was ensured to remain at 150 ml. If the reading was less than 150 ml, an amount of fresh water was added. If the reading was more than 150 ml, the solution was gently heated to vaporize some amounts with some adjustment with freshwater addition until its volume returned to 150 ml. This was done to minimize uncertainty due to accidental external water addition or removal (natural water carried

by the potatoes and residue water from the boiling). the solution was centrifuged to separate the solution from the potato starch. Refractometer was used to measure the salinity of the salt solution before the potato was introduced and after the potato was removed. Figure 1 summarizes the methodology for the first set of experiment and second applied similar approach.

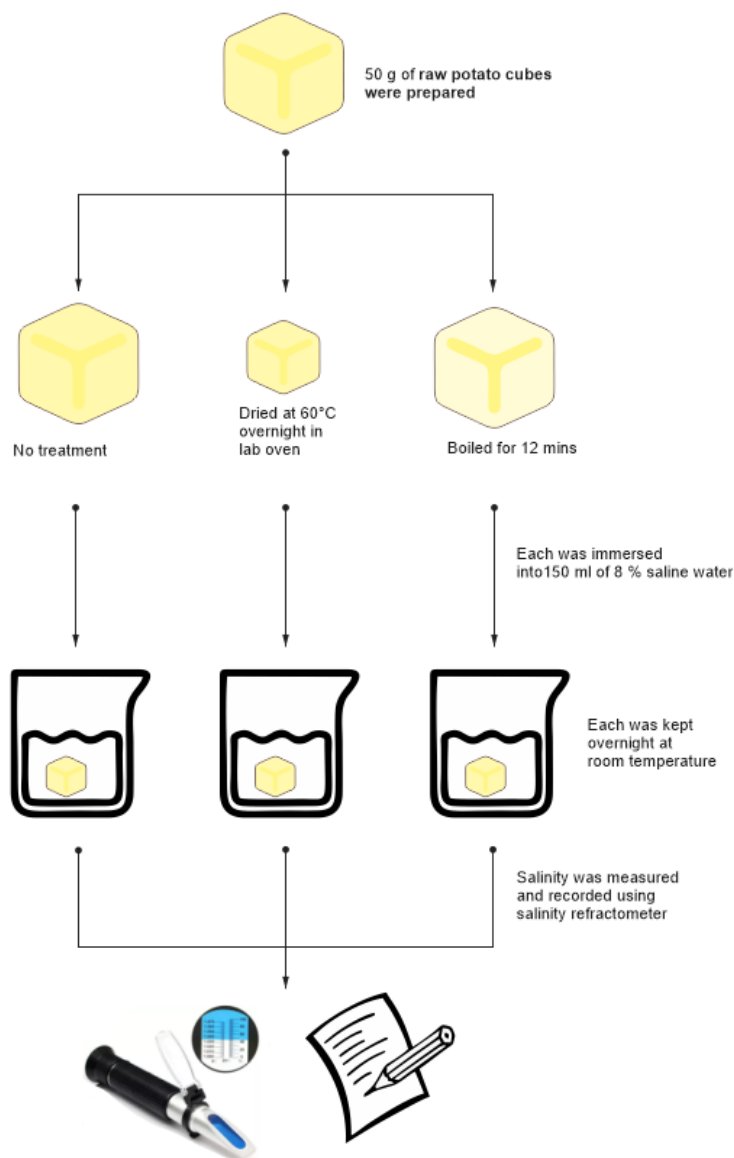


Figure 1. Methods used in the experimentation

For the first series experiment, the three batches of potatoes are given different treatments before being left to soak in 80 g.dm^{-3} Natrium Chloride Solution. The first batch was the cut raw potatoes that were directly immersed into the salt solution. The second batch was the cut raw potatoes were dried until the mass reached constant, and then immersed into the salt solution. And the third batch was the cut potatoes were boiled for 12 minutes (till it is soft), tossed, and then immersed into the salt solution. Each salt solution was 150 ml. The experiment was repeated 3 times.

For the second series of experiment, the potatoes were all boiled for 12 minutes before it was put into salt solution. However, the potatoes were categorized into four batches and each batch of potato was left to soak in natrium chloride solutions with

different concentrations which are 20 g.dm^{-3} , 40 g.dm^{-3} , 60 g.dm^{-3} and 80 g.dm^{-3} respectively. The experiment was repeated 3 times.

RESULTS AND DISCUSSION

Table 1 summarizes the results of this experiment. Significant reduction of salinity can be observed for raw potatoes and boiled potatoes by 13.73% and 19.22%, respectively. This indicates that the use of potato is able to reduce the salinity of salt solutions. Our initial hypothesis was that the reduction was caused by the potato possibly being an effective adsorbent for dissolved salts. However, the results from sample 2 which used potato with dried treatment did not demonstrate any changes in the salinity of salt solution. Therefore, we can safely conclude that the potato structure itself has no adsorbing properties in capturing dissolved salts since other adsorbents such as activated carbon and zeolites are normally prepared as dried materials (Arafat *et al.*, 1999; Goursot *et al.*, 1997).

Table 1. Differently treated potato vs salinity reduction

Sample	Treatment	Salinity (permille)		Salinity Reduction (average)
		before	After (average)	
Control	no potato	85	84.33	0.78%
1	Raw potatoes	85	73.33	13.73%
2	Dried Potatoes	85	84.67	0.39%
3	Boiled potatoes	85	68.67	19.22%

On the other hand, the results of our experiment showed that the potato was able to reduce the salinity of a salt solution because the potato acted as a water carrier. It is believed that the reduction of the salinity was due to the movement of salt ions from the concentrated solution to the less concentrated solution. In this case, the potato actually functions as a fresh water carrier that provides a medium to receive a portion of the salt ions from the concentrated salt solution. As some of the salt diffuses into the less concentrated region in the potato, the whole salinity of the solution is equalized, thus the salinity of the whole solution was reduced (Periasamy *et al.*, 2016). Figure 1 shows a diagram proposing the mechanism in the salinity reduction by the potato in our case.

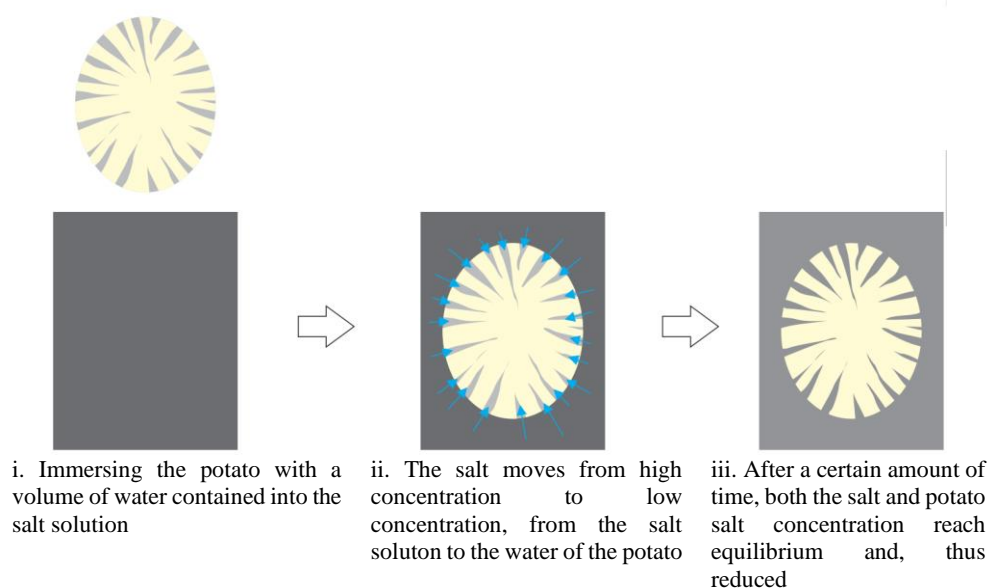


Figure 2. Proposed mechanism on how the salt concentration is reduced by potato

This explanation can be further supported by Table 2 which shows that sample 4, which has the highest concentration of salt, has the highest reduction of salinity. In the case of adsorption such as zeolite or activated carbon, the reduction could achieve up to 100% and independent of the concentration. However, since no adsorption is involved, the reduction is highly depend on the concentration of the salt and the amount of water in the potato pores.

Table 2. Different salt concentrations vs salinity reduction

Sample	Salt Concentration (gdm^{-3})	Salinity (permille)		Salinity Reduction (average)
		before	After (average)	
Control	no potato	0	5	-
1	20	23	21	8.70%
2	40	43	40	6.98%
3	60	63	56	11.11%
4	80	82	66	19.51%

CONCLUSION

In conclusion, the results of our study confirms the legitimacy of the “rumour” where putting potatoes would help reduce the salinity of dishes. However, the potatoes must be cooked first before being used to increase the water volume to reduce the salinity of the dishes. Therefore, this might be a highly efficient method to save accidentally over salted soups.

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