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STUDIES ON THE SOFT DRINK TABLETS (SDT) POST COMMERCIAL PRODUCTION PROBLEMS AND ITS SOLUTION

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Bulging of commercial packets of Soft Drink Tablets (SDT) can be avoided by using preheated sodium bicarbonate or non-heated sodium carbonate. The granulation of the ingredients of the SDT has no significant effect on bulging of packets.

Key words: Soft drink tablets; Granulation; Soft drink powder; Moisture absorption.

INTRODUCTION

Carbonated non-alcoholic beverages commonly known as soda may be defined as beverages that are some times acidified and at times have salts or minerals added that are artificially charged with carbon dioxide and that contain no alcohol and it is generally called soft drink [1]. A scheme for the production of Soft Drink Tablets (SDT) has been devised for the preperation of beverages based upon experiments described below.

The SDT scheme was commercialised some times back by a local industrialist by acquiring the know-how from the PCSIR, Karachi Laboratories. The product received good acceptance in the market. However, like other new industrial products, the SDT has also suffered some post commercial problems, which are as principally as follows:

1. The tablets have been found suceptible to the absorption of moisture from the atmosphere, thus hindering smooth production of SDT.

2. Due to the hygroscopic nature of SDT, its shelf life has been found to be unsatisfactory as under humid conditions SDT can not be stored for longer periods.

3. The sealed packing of SDT on long storage at a warm place, bulges due to the production of CO_2 gas inside the sealed cover, imparting a somewhat poor appearance to the product.

4. SDT drawn from a bulged packing dissolves slowly, and the pace of effervescence is retarded. However, there is no adverse effect on its solubility as the tablet dissolves completely.

The present study has been undertaken in order to came out with solutions to the problems mentioned above.

EXPERIMENTAL

According to formula developed by the Karachi Laboratories the preparation of SDT was effected by using organic acids, sugar, artificial sweetners, basic salts like Na_2CO_3 and NaH CO_3, food colour and flavoures. These ingredients have been divided into the two groups.

Group I consisting of an organic acid (Mix A); and

Group II Containing a basic salt, i.e. $NaHCO_3$ or Na_2CO_3, together with sugars, artificial sweetners, food colour and flavour (Mix B).

The preparation of SDT was brought about by combining the first group with the second, either in powdery form or by making granules of the ingredients to get Mix C which was used as the final mix for feeding the tableting machine for making SDT, each weighing 5 g.

The granulation was effected by mixing the powder of each group separately with 10 % soluble starch solution in the conventional way and sieved through 12-mesh sieve. The granules were finally dried at 60°.

In order to assess the rate of moisture absorption or dissipation in the individual ingredient and in the mixes of A,B and C made for the preparation of Soft Drink Tablets, the following experiments were conducted.

Experiment 1. Each individual ingredient of SDT was kept open in powdered form at room temperature under atmospheric conditions.

During the entire period of the experiment, the weight of the material was recorded at the regular intervals of 5 days, for a period of 30 days. Results are given in the Fig. 1.

Experiment 2. In the second experiment intermediate mixes A,B, and C were prepared by using powdered ingredients. Non-heated and preheated sodium bicarbonate was used as the basic salt. The moisture absorption or dissipation was estimated by exposing the intermediate

mixes A, B, and C to open atmosphere at room temperature. The variation in weights was recorded at regular intervals of 5 days, for a period of 30 days. Results are given in Fig. 2.

Experiment 3. In this experiment, the method for the preparation of ingredients was changed through the conversion of all powdered ingredients in the granules and subsequently intermediate mixes of A,B and C were prepared in an identical manner as in experiment 2. The determination of weight gain/loss was noted. The mixes (A,B and C) were kept exposed to atmosphere at room temperature and weights were noted at regular intervals of 5 days for 30 days. The results are reported in Fig. 3.

Experiment 4. In this experiment the intermediate mixes A,B, and C were prepared by a procedure similar to that in experiment 2 by replacing sodium bicarbonate with powdered sodium carbonate. The determination of weight gain/loss was made in the way described earlier.

The results are given in Fig. 4.

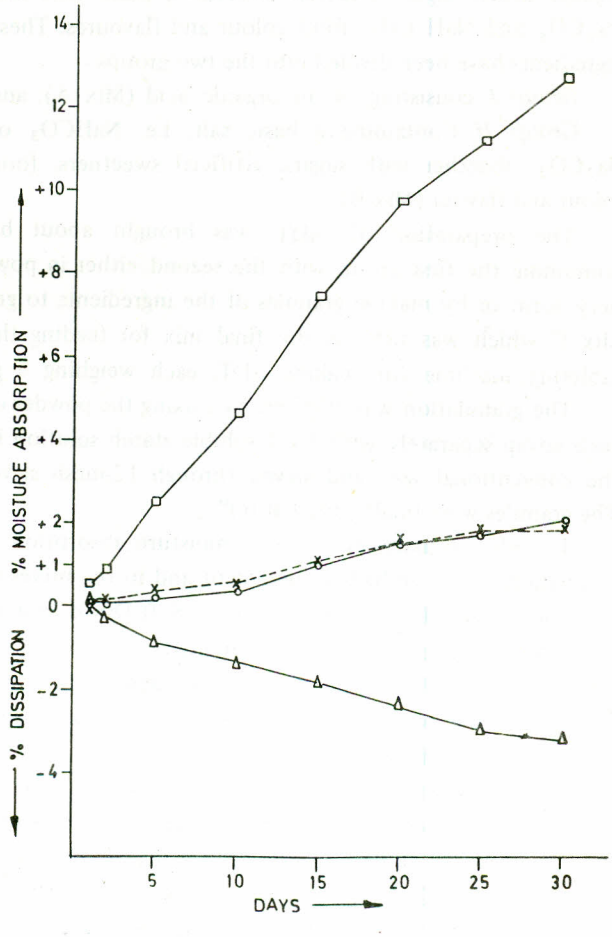

Fig. 1. SDT Ingredients at room conditions.
○ – ○ Pre-heated $NaHCO_3$; □ – □ *o*-Phosphoric acid;
△ – △ Artificial sweetener; X – X Pre-heated Na_2CO_3.

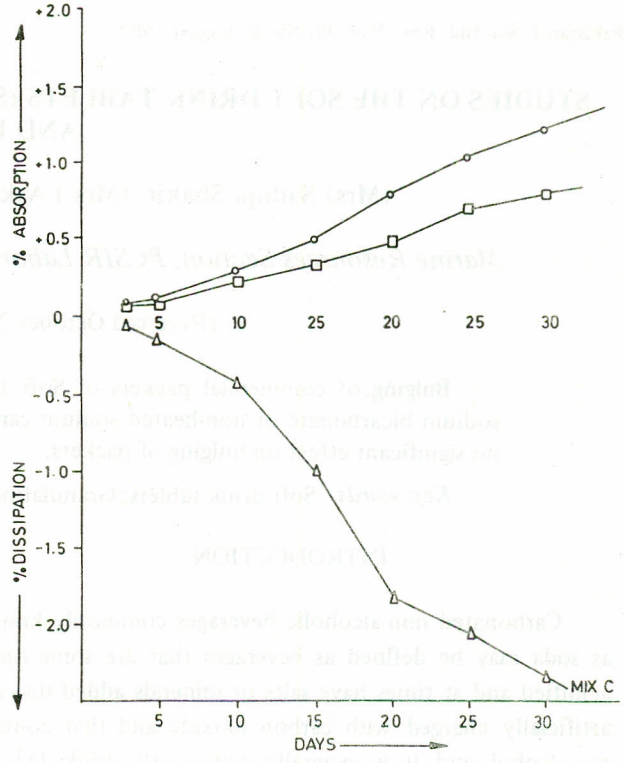

Fig. 2. Pre-heated + non-heated $NaHCO_3$ mixes.
○ – ○ Mix B } Pre-heated $NaHCO_3$; △ – △ Mix C non-heated
□ – □ Mix C } $NaHCO_3$.

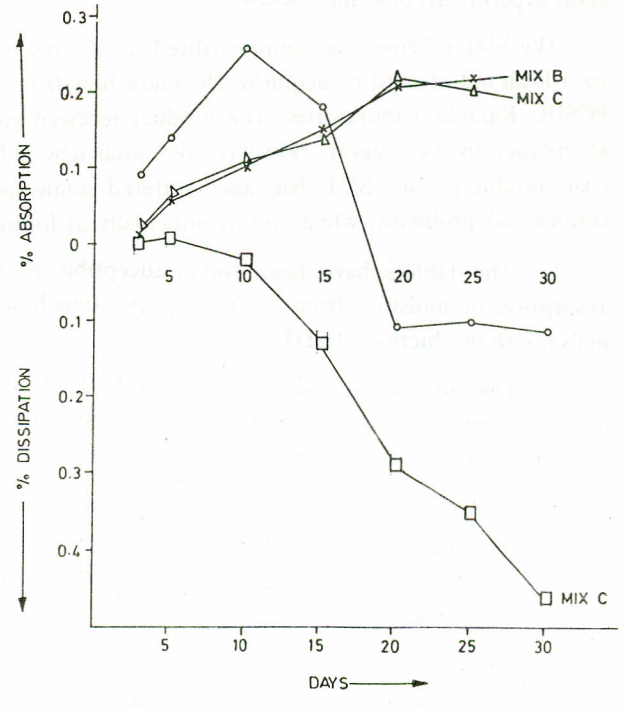

Fig. 3. Non-heated and preheated $NaHCO_3$ granules at room conditions.
○ – ○ Mix B
□ – □ Mix C } Non-heated $NaHCO_3$
△ – △ MIX C
X – X MIX B } Heated $NaHCO_3$.

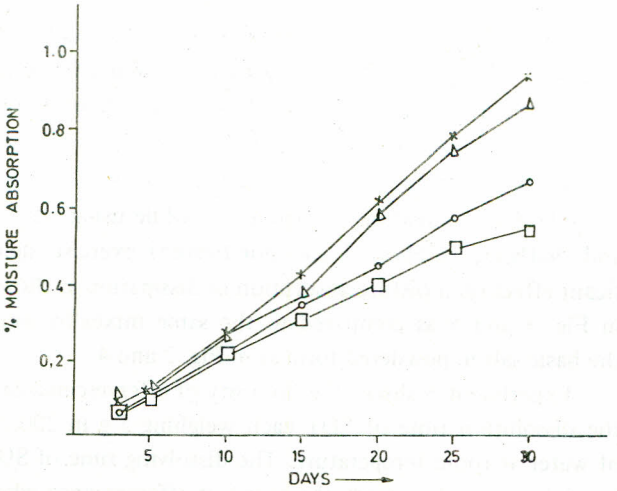

Fig. 4. Pre-heated and non-pheated Na_2CO_3 mixes at room conditions.
○ – ○ Mix B
□ – □ Mix C Non-heated Na_2CO_3:
X – X Mix B
△ – △ MIX C Pre-heated Na_2CO_3.

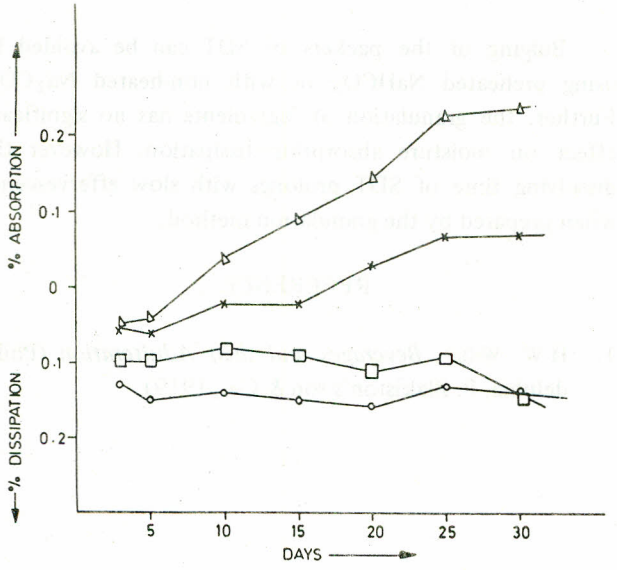

Fig. 5 Non-heated and pre-heated Na_2CO_3 granule mixes at room conditions.
○ – ○ Mix B
□ – □ Mix C Non-heated Na_2CO_3;
X – X Mix B
△ – △ MIX C Pre-heated Na_2CO_3.

Experiment 5. In this experiment, the intermediate mixes of A,B, and C were prepared by converting all powdered ingredients into granules but this time non-heated and preheated sodium carbonate was used in place of sodium bicarbonate. The results are given in Fig. 5.

Experiment 6. In this experiment, the duration of the dissolving time of Soft Drink Tablet each weighing 5 g,

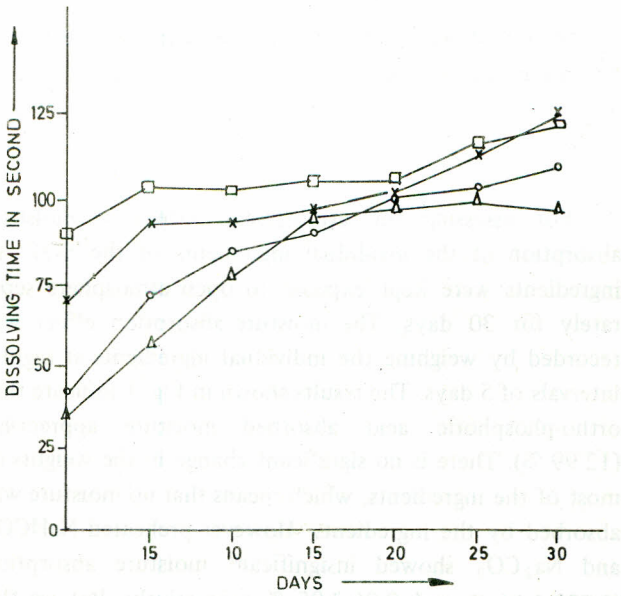

Fig. 6(a). Dissolving time of SDT with pre-heated + non-heated $NaHCO_3$.
○ – ○ Powder
□ – □ Granules Non-heated $NaHCO_3$;
△ – △ Powder
X – X Granules Pre-heated $NaHCO_3$.

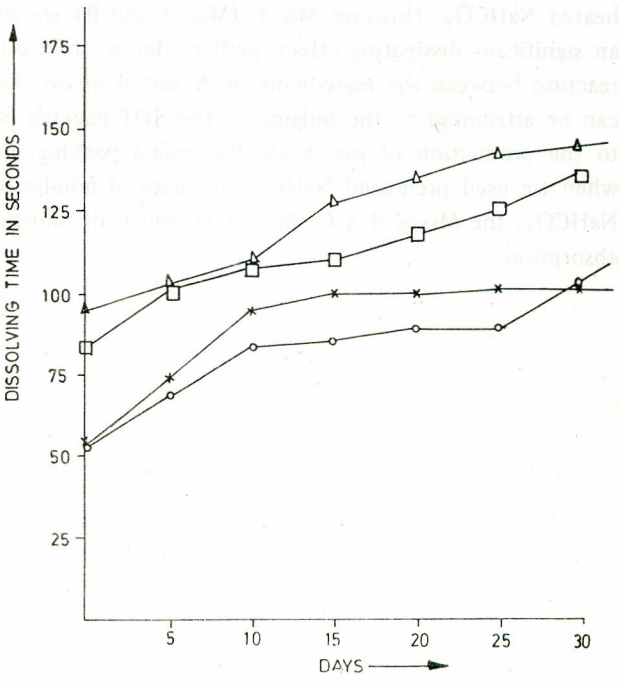

Fig. 6(b). Dissolving time of STD with pre-heated and non-heated Na_2CO_3 at room condtions.
○ – ○ Powder
□ – □ Granules Non-heated Na_2CO_3;
X – X Powder
△ – △ Granules Pre-heated Na_2CO_3.

in 200 ml of water at room temperature was recorded. The results are given in Fig. 6(a).

DISCUSSION

For assessing the atmospheric effect of moisture absorption of the invididual ingredients of the SDT. all ingredients were kept exposed to open atmosphere separately for 30 days. The moisture absorption effect was recorded by weighing the individual ingredients at regular intervals of 5 days. The results shown in Fig. 1 indicate that ortho-phosphoric acid absorbed moisture appreciably (12.99 %). There is no significant change in the weights of most of the ingredients, which means that no moisture was absorbed by the ingredients. However preheated $NaHCO_3$ and Na_2CO_3 showed insignificant moisture absorption (0.030-2.16 % and 0.06-2.05 % respectively. But on the contrary some dehydrating effect in respect of the artificial sweetner (0.18-3.11 %) was noted.

In the experiment of intermediate mixes (Fig. 2) no significant change in the weight of Mix A was noticed on keeping it exposed to the atmosphere for 30 days. Similarly there was no visible change in Mix B. as well as in non-heated $NaHCO_3$. However Mix C (Mix A and B). showed an significant dissipating effect, perhaps due to solid state reaction between the ingredients of A and B mixes. This can be attributed to the bulging of the SDT packing due to the production of gas inside the sealed packing. But when we used preheated $NaHCO_3$ in place of non-heated $NaHCO_3$, the Mixes B x C showed tendency of moisture absorption.

No significant difference was observed when powdered Na_2CO_3 was used either in heated or preheated form (Fig. 4). All powdered intermediate mixes have shown insignificant moisture absorption. The results are fairly comparable with powdered intermediate mixes of preheated $NaHCO_3$ granulation of ingredients while using $NaCO_3$ and $NaHCO_3$ (preheated and non-heated) exercise significant effect on moisture absorption or dissipation as shown in Fig. 3 and 5 as compared to the same mixes by using the basic salt in powdered form as in Fig. 2 and 4.

Experiment 6 shows the intensity of effervescence and the dissolution time of SDT each weighing 5 g in 200 ml of water at room temperature. The dissolving time of SDT is minimum with respect the speed of effervescence when prepared with preheated $NaHCO_3$ than non-heated in powdered form. No visible difference has been found in the dissolving time in SDT under similar conditions when prepared with non-heated and preheated Na_2CO_3.

CONCLUSION

Bulging of the packets of SDT can be avoided by using preheated $NaHCO_3$ or with non-heated Na_2CO_3. Further, the granulation of ingredients has no significant effect on moisture absorption/dissipation. However the dissolving time of SDT prolongs with slow effervescence when prepared by the granulation method.

REFERENCE

1. H.W. Wiley, *Beverages and their Adulteration* (Philadelphia, P. Blakiston's son & Co., 1919).