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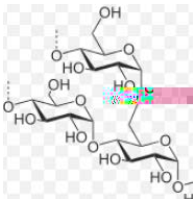
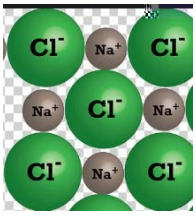
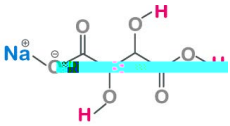
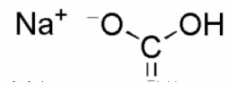
Abstract

[illegible]

Experimental: Corn starch is pure starch with a formula of $C_{27}H_{48}O_{20}$ and is known to be used as liquid thickener [12]. Red beet powder is used as dye that colors the tablet [13]. Table salt is sodium chloride with formula NaCl and molar mass of and this salt has a neutral PH, PH = 7 [14]. Cream tartar is potassium bitartrate with formula $KC_4H_5O_6$ and molar mass: 188.177 g/mol [15]. Baking soda is a weak base with a formula of $NaHCO_3$ and molar mass: 84.007 g/mol [16]. Citric acid is a triprotic acid, a weak organic acid that has the formula of $C_6H_8O_7$ and molar mass: 192.124 g/mol [17] (Table 1). T e bubbling during creating the tablet using water a binding agent is due to the reaction between weak acid (citric acid) and potassium bitartrate with the weak base (baking soda) to form salt, water, and carbon dioxide, causes loss of bubbles while making the tablet. To get the maximum amount of yield, maximum amount of CO_2 per tablet, intern the greatest amount of bubbling, number of moles of Cirtic acid to sodium hydrogen carbonate must be 1:3 and number of moles of sodium bitartrate to sodium hydrogen carbonate must be 1:1 according

Household Chemical and Chemical Name	Chemical structure	Molecular Formula	Molecular Weight (g/mol)
[illegible]		& H O	
[illegible]		[illegible]	
[illegible]		[illegible]	
[illegible]		[illegible]	
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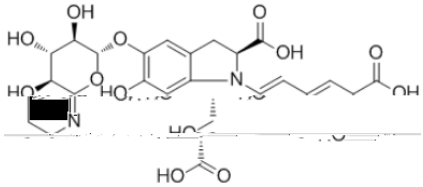
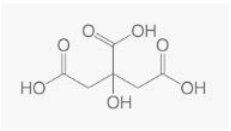
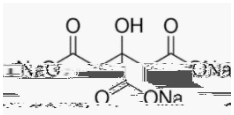
[illegible]		& H 1	

to the balanced chemical equations. Vitamin C [17] citric acid is a triprotic acid containing three acidic group and one hydroxyl group [17]. T e hydroxyl groups (-OH) are alcoholic groups, and they don't react with Sodium hydrogen carbonate, baking soda, while the acidic groups, carboxylic group (-COOH) can react with Sodium hydrogen carbonate to form salt, carbon dioxide and water. T e bubbling is due to the formation of carbon dioxide as a product. T e molar-amount of citric acid and sodium bicarbonate reactants must be 1: 3 to produce the maximum amount of bubbling in the formula per tablet:



+ 3 $NaHCO_3$ ˘



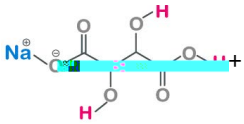
+ $3H_2O$+ $3CO_2$

Citric acid baking soda

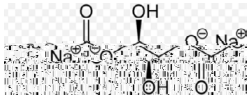
Using 1 g of vitamin C with formula CHO in the ingredients, the amount needed for reaction to go to completion and produce the maximum amount of carbon dioxide, and hence the maximum amount of bubbling would be 1.3 grams of baking soda as follows:

1 g /192.124 g/mol * 3 NaHCO /1 CHO * 84.007 g/mol= 1.312 g of $NaHCO_3$

Cream tartar [15]. potassium bitartrate is a monoprotic acid containing on acidic group and two hydroxyl groups. T e hydroxyl groups (-OH) are alcoholic groups, and they don't react with Sodium hydrogen carbonate, baking soda, while the acidic group, carboxylic group (-COOH) can react with Sodium hydrogen carbonate to form salt, carbon dioxide and water. T e bubbling is due to the formation of carbon dioxide as a product. Using 1g of cream tartar, potassium bitartrate with formula KCHO in the ingredients, the amount needed for reaction to go to completion and produce the maximum amount of carbon dioxide, and hence the maximum amount of bubbling would be grams of baking soda as follows:



+ $NaHCO_3$ ˘



+H_2O

1g/ 188.17g/mol * 1 $NaHCO_3$/1 KCHO * 84.007 g/mol= 0.4464 g of $NaHCO_3$.

T e number of grams of sodium hydrogen carbonate needed to completely neutralize 1 g of vitamin C and 1 g of sodium bitartrate must be 1.3117g+ 0.4464g = 1.76g.

Water as a binding agent causes bubble loss during creating the tablet and glycerol would act as a better binding agent since sugars would cause bubbling to persist and the compounds in the ingredients are inert in glycerol. Sodium chloride reduces bubble formation, the amount of base used was insu f cient to neutralize both citric acid and Potassium bitartrate in the formula. (Figure 1)

Conclusion

T e tablets have been created using the correct molar amount for each chemical in the ingredients and the amount of bubbling as increased signi f cantly, the number of bubbles formed has doubled using the correct formula. Using 1 g of Vitamin C and 1g of Sodium bitartrate, 1.76g of Sodium Hydrogen carbonate is needed in the ingredients to get the maximum amount of yield, maximum amount of CO_2 in the product, in turn the maximum amount of bubbling per tablet in the formula. For the tablet to look smoother and for equal distribution of each of the compounds in the ingredient per table, the ingredients must be grinded to powder before adding the binding agent, glycerol. Sugars including glycerol, sugar alcohol and sucrose are good additives to cause to persistence of bubbling forming ability of the tablet created. It is also found that using sodium chloride would prevent forming bubbles, using greater number of moles of starch would cause tablet to be thicker on snow and glycerol acted as an ideal chemical binding agent for the ingredient.

References