

Identification of Unknown Cake Mixes

Summary: My group and I tested four random store-bought cake mixes for reducing sugars, starches, fats and proteins. The amount of fat, carbohydrates, sugars and protein per serving for each of the mystery cake mixes was provided beforehand. I used this information to make determinations about which sample best correlated with a specific cake mix's properties (or ingredients), as each of the cake mixes came in varying forms, such as non-fat, reduced fat, sugar free, low sugar, and low to high amounts of carbohydrates. The same tests and procedures were used from the *Identification of Biological Molecules* experiment. Using the data obtained from our experiments, I have concluded that sample A is cake mix #2, sample B is cake mix #3, sample C is cake mix #1, and sample D is cake mix #4.

Methods & Results: Below is the information that was provided for each of the four mystery cake mixes about its number of grams of fat, carbohydrates, sugars and protein (per serving).

	Total Fat	Total Carbohydrates	Sugars	Protein	Serving Size
Cake Mix #1	3g	28g	9g	3g	38g
Cake Mix #2	0g	37g	17g	1g	43g
Cake Mix #3	7g	45g	26g	2g	57g
Cake Mix #4	0g	24g	0g	2g	30g

For each test, I used the same procedures as in the previous experiment *Identification of Biological Molecules*. This produced the following results (as before, more plus signs "+" indicate a stronger positive and NR means no reaction occurred):

	Benedict's Test	Iodine Test	Sudan IV Test	Biuret Test
Sample A	++ (Weak)	++++ (Strong)	NR	++++ (Strong)
Sample B	++++ (Strong)	+++ (Moderate)	++ (Weak)	NR
Sample C	+++ (Moderate)	++++ (Strong)	++ (Weak)	++ (Weak)
Sample D	NR	++++ (Strong)	NR	+++ (Moderate)

Since sample D was the only mix that tested negative for sugars, I have concluded that it is cake mix #4, since its ingredients indicate that it is sugar free. Results for sample B show that it had the strongest reaction for the presence of sugars and a weak reaction for the presence of fats. While it tested negative for proteins and actually has 2g per serving, most of the data indicates that its identity is cake mix #3. Results for sample A show that it had a weak reaction for the presence of sugars and the second negative result for the presence of fat cells, indicating that its identity is most likely to be cake mix #2. However, it also had the strongest reaction in the group for proteins when it should have had very little (1g), which highlights an undesirable inconsistency. Finally, results for sample C show that it had a moderate reaction for the presence of sugars and weak reactions for the presence of both fats and proteins, indicating that its identity is most likely to be cake mix #1.

Due to some inconsistencies between my group's experimental data and the lists of ingredients, I found that giving priority to negative results for *sugars* and *fats* when assigning identities created the most plausible identities.