

Table 3. Data Table

Toothpaste	Control	#1	#2	#3	#4	#5
<b>Test 1</b> Appearance/Scent (Naked eye)						
<b>Test 1</b> Appearance (Microscope)						
<b>Test 2</b> Abrasiveness (Rating 0=no abrasion to 5=high)						
<b>Test 3</b> pH						
<b>Test 4</b> Fluoride (Y-N) (# of drops)						
<b>Test 5</b> Foaming Ability (Foam Level in cm)						
<b>Test 6</b> Value Cost of tube Tube size (oz.) Cost per oz.						
<b>Other Information Given On Label</b>						

# Questions and Analysis of Data

Refer to the data in Table 1 to answer the following questions.

## Test 1. Appearance

Natural and artificial colors and flavors are added to toothpastes to give them a pleasing appearance, taste, and scent.

1. Which of the toothpaste samples that you observed would you be most likely to use (based on appearance—color, scent, consistency) and why?
2. List some colors of toothpaste that would *not* be big sellers to consumers. Why?
3. List some flavors (or scents) of toothpaste that would *not* be big sellers to consumers. Why?
4. When you looked at the toothpaste samples under the microscope, did you find that some samples had larger crystals and others had smaller crystals? Did you see any pattern?

## Test 2. Abrasiveness

The active ingredient in toothpaste is an abrasive agent. Too little abrasiveness decreases the cleansing power. Too much abrasiveness can scratch the enamel of the tooth.

5. Rank the toothpaste samples from most abrasive to least abrasive.
6. What was the purpose of performing steps 1–4 in Test 2 (Rubbing the cotton swab in the water on the slide *without* a toothpaste sample)?
7. Why is a good abrasive important in a toothpaste?
8. What are some of the dangers of using a toothpaste with too harsh of an abrasive?
9. If a tartar control toothpaste was tested, did it show high or low abrasion? Is this what would be expected? Why?

### Test 3. pH

The allowable pH range of toothpaste is quite wide (pH 4.2 to 10.5); however, toothpastes with a pH higher than 7 will have a bitter taste while those with a pH lower than 7 will have a sour taste. (Quinine and caffeine, for example, display a bitter taste while vinegar and citrus display a sour taste.)

10. Rank the toothpaste samples from the most basic (high pH) to the most acidic (low pH).
11. Do any of the toothpaste samples have a pH out of the acceptable range of pH?
12. Which samples will taste more bitter?
13. Which samples will taste more sour?
14. What other factors do you think might affect the taste (flavor) of the toothpaste besides pH?

### Test 4. Fluoride

Fluoride is added to most toothpastes in the form of sodium fluoride or sodium monofluorophosphate. In this lab, a qualitative fluoride test was performed.

15. Why is fluoride added to toothpaste?
16. In what two ways does fluoride work?
17. Did any of the toothpaste samples contain no fluoride? Which ones?
18. Of those samples that were found to contain fluoride, list them in order from the most fluoride present (fewest drops needed) to the least fluoride present (most drops needed).
19. Did you find any discrepancies between the actual fluoride content and the claims on the label? Explain.

## Test 5. Foaming Ability

Surfactants are added to most toothpastes to aid in the formation of lather.

20. What is another purpose of adding surfactants to toothpaste?
  
  
  
  
  
  
  
  
  
  
21. Rank the toothpastes in order from the one that gave the most foam to the one that produced the least.
  
  
  
  
  
  
  
  
  
  
22. Why do you think consumers like a toothpaste that foams?

## Test 6. Values

23. Refer to Table 1 and rank the five toothpaste samples in order from lowest cost per ounce to greatest cost per ounce.
  
  
  
  
  
  
  
  
  
  
24. Is the toothpaste which has the lowest cost per ounce necessarily the best value? Explain.
  
  
  
  
  
  
  
  
  
  
25. Is the toothpaste that has the greatest cost per ounce the best toothpaste? Look at your data and explain your answer.

## Conclusions

26. Would your results be different if tap water had been used in all of the testing rather than distilled water? Explain why or why not and how results may have been different.
  
  
  
  
  
  
  
  
  
  
27. How would a toothpaste manufacturer attempt to increase the sales of toothpaste? List as many ways as possible.