Name_____

Table 2

Shampoo Sample	Control	1	2	3	4	5
Dish (g)						
Dish & Shampoo (g) — Wet						
Dish & Shampoo (g) — Dry						
Shampoo — Wet (g)						
Shampoo — Dry (g)						
% Solids = $\dfrac{\text{Dry weight}}{\text{Wet weight}} \times 100\%$						
% Solids × 2 = Actual % Solids						

Percent Solids

Table 3

Sample	Percent Solids	pH	Foam Level (mm)	Grease-Cutting Ability	Fragrance
Control					
1					
2					
3					
4					
5					

Table 4

Brand	Cost per oz.	Texture	Ability to Comb (good, average, poor)	Body/Appearance	Do You Like? Why or Why Not?
Home Sample 1					
Home Sample 2					

Questions and Analysis of Data

Refer to the data in your tables to answer the following questions

Test 1. Percent Solids

The percent solids value is an indicator of the actual amount of non-volatile solid material, called "dry weight." Thus, a higher percent solids means that there is less filler solvent while a lower percent solids indicates more filler solvent. What is the solid material that is left? Refer to Table 1 to see that the solid material is a mixture of many ingredients, with the majority of the weight attributed to the surfactant, the cleaning agent in the shampoo. Shampoo formulations vary in their percentage of solids. A good shampoo will usually have at least 18% solids and possibly have as much as 30%.

1. Refer to your data and rank the five shampoo samples from highest to lowest percent solids.

2. Which shampoo(s), if any, are not within the acceptable percent solids range?

3. Why is it necessary to run a control sample in this test as well as in all of the tests?

4. Did results indicate any solids in the control? How do you know?

Test 2. pH

pH adjusters are added to shampoos to maintain a slightly acidic pH of about 4–6, although it is common for pH to go as high as 7 (neutral pH).

5. Why is it better to keep hair under slightly acidic conditions?

6. What will happen to the hair at a higher pH (basic conditions)?

7. Rank the five shampoo samples from most acidic (low pH) to least acidic (high pH).

8. Which shampoo(s), if any, are not within the acceptable pH range?

Test 3. Foaming Ability

Foaming agents are added to shampoos to aid in the formation of lather. This lather helps to carry the dirt into the water layer so that it easily rinses out. In addition, consumers like a shampoo that lathers up a great deal. A good shampoo should give a foam height in the range of 40–80 mm.

9. Rank the five shampoo samples in order from highest to lowest foam height.

10. Which shampoo(s), if any, are not within the acceptable range of foam height?

11. Why do you think consumers like their shampoo to foam?

12. How did the shampoo that foamed the most compare to its rank for dry weight?

Test 4. Grease-Cutting Ability

The grease-cutting test performed in this lab was a qualitative test to determine if the shampoo has the ability to "cut grease" or, in other words, to wash the oil into the water layer. (Comparisons among the five shampoos will not be made as no quantitative measurement was made.) How does shampoo "cut grease"?

13. Explain how a micelle allows grease or oil to dissolve in water.

14. Refer to your data and explain the differences between the control (oil and water) and the test samples (oil, water, and shampoo).

15. Did you observe any differences among the five shampoos in the ability to emulsify the oil droplets? Explain.

16. How important do you think the ability to cut grease is when comparing shampoos? Defend your answer.

17. An ideal shampoo might remove enough grease and oil to clean the hair, but not so much as to cause the scalp and hair to become overly dry or flaky. How does a shampoo accomplish this feat?

Test 5. Fragrance

While this tends to be a very individual preference, fragrance may often be a key reason that some people choose a shampoo.

18. Rank the five shampoo samples in order from the fragrance you liked best to the one you liked least.

Conclusions

19. Overall, which shampoo do you think has the greatest amount of actual surfactant? Does your answer necessarily correspond to the one with the greatest dry weight? Explain.

20. Based on all of the information gathered and your rankings for each of the tests, which shampoo would you claim is the overall best? Why? Defend your choice.

21. Which shampoo would you claim is the overall worst? Why? Defend your choice.

22. In addition to the factors tested, list at least 3 additional factors that would influence you to purchase a certain shampoo.

23. Discuss the differences in your results that you may have observed if tap water had been used for the tests rather than distilled water.

Test 6. Home Project (Optional)

If your class performed the home project and gathered data, write a general conclusion summarizing your data about shampoo performance and cost per ounce.