

Lisa Shimomoto
Elizabeth Tainer
Jennifer Grossbard
Daniel Ferguson

Determining the Best Brand of Nail Polish

Introduction

We decided to test nail polish due to its abundance and common use among the student population. The abundance of nail polish is due to the fact that it is a simple and affordable beauty enhancer. However, it is very problematic if the product does not function as expected, as nail polish can diminish the appeal of the consumer's nails at the expense of the consumer's wallet. According to our criteria, good nail polish is easy to apply, dries quickly, does not chip or wear with everyday use, is easy to remove, and is a reasonably affordable. To determine if the polish satisfies the criteria listed above, we conducted several tests including the Ease of Application Test, Drying Time Test, Natural Wear Test, and Removability Test. Furthermore, we researched the price of each polish to compare the value with the overall effectiveness of the product. The aim of this project was to assist people in choosing the most effective nail polish by recommending the brand of nail polish that we find to be the most useful and cost efficient.

Criteria

The effectiveness of nail polish is determined by factors such as ease of application, dry time, durability, and removability. Ease of application and quick dry time are essential characteristics of nail polish, since the overall appearance is dependent on both of these factors. Easy to apply polish leaves little to no unevenness in the topography and color of the coats, whilst a quick drying time minimizes the time period during which the applied product can be accidentally altered or disturbed. Durability is another important characteristic as the longer the nail polish stays on the nails, the longer it takes for the consumer to deplete the bottle allowing the customer more wear per bottle of polish. Ease of removability is not as important as the other characteristics listed previously, but it is a characteristic all nail polish should have in case the consumer makes a mistake when applying the product to their nails. Unfortunately, all of these characteristics, along with the actual nail polish itself, comes with a price tag. Each polish should be obtainable at a reasonable price in order for the product to be considered a worthy purchase.

Tests

Drying Time Test

We conducted several tests to determine the effectiveness of the nine brands of nail polish in our possession. We began our evaluation with the Drying Time Test, which consisted of gluing fake nails onto a support -- a paper plate in this case -- painting the nails, and using a stopwatch to determine the time period it took for the polish on each nail to dry. We conducted two trials for

each of the nine brands of nail polish. The data for the trials, along with the average time needed for each nail polish to dry, is presented in the chart and graph below.

| Nail Polish Brand | Trial One (Seconds) | Trial Two (Seconds) | Average (Seconds) |
|---------------------------------|---------------------|---------------------|--------------------------|
| Hot Topic | 98 | 117 | 105 |
| Wet n Wild (FD) | 69 | 53 | 61 |
| Sinful Colors | 357 | 187 | 272 |
| Sally Hansen (Diamond Strength) | 107 | 105 | 106 |
| Claire's | 53 | 59 | 56 |
| Love and Beauty | 144 | 151 | 148 |
| Pure ICE | 145 | 159 | 152 |
| Sinful Colors | 147 | 135 | 141 |
| Spiritual | 129 | 127 | 128 |

Figure 1 A. Drying time for different nail polish brands, where FD is an abbreviation for “Fast Dry”. The average times obtained from the two trials are listed (in bold) in the leftmost column.

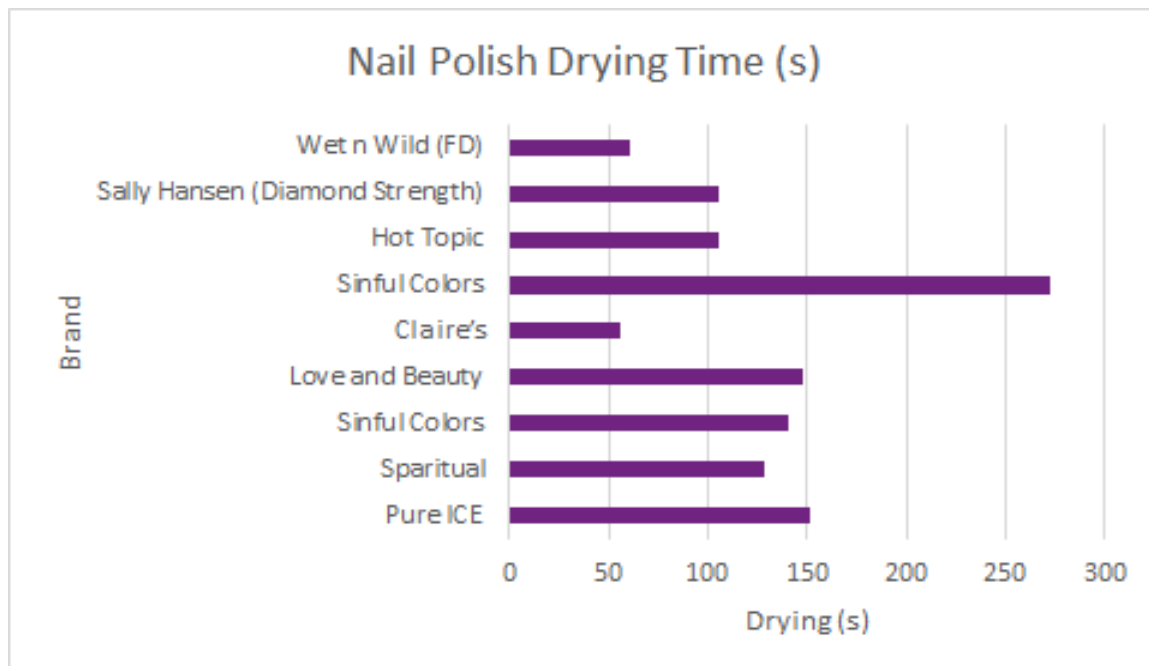


Figure 1 B. Shows the average drying time on each brand.

Ease of Application Test

The second test performed was the Ease of Application Test; the factors that determine ease of application are spread-ability and cohesion of product. Spread-ability was determined while applying the nail polish to actual finger nails. The ease of application is described on a scale of one to five, where one refers to horrible application, and five refers to excellent application. Horrible application is defined as nail polish that is either too watery and runs off of the nail, or too thick to be spread around with uneven topography and pooling of product. Excellent application is defined as nail polish that is sufficiently thick and stays on applied portion of nail without running or causing uneven topography. The results of this test is shown below.

| Nail Polish | Ease of Application (1-5) |
|---------------------------------|---------------------------|
| Hot Topic | 2 |
| Wet n Wild (FD) | 3 |
| Sinful Colors | 5 |
| Sally Hansen (Diamond Strength) | 4 |
| Claire's | 3 |
| Love and Beauty | 4 |
| Pure ICE | 3 |
| Sinful Colors | 3 |
| Sparitual | 4 |

Figure 2. Ease of Application test results, on a scale of 1 - 5, where 1 is horrible application and 5 is excellent application.

Natural Wear Test

We wore the nail polish ourselves without a topcoat and observed it's deterioration over time to see how well each nail polish would actually perform. We painted each nail with a different color polish, took photos, and made daily observations about the wear over the course of time. The table below illustrates the number of days until the first chip appeared on the nail polish.

| Nail Polish | Days Until First Chip | Nail Polish | Days Until First Chip |
|---------------|-----------------------|-----------------|-----------------------|
| Wet n Wild | 1 | Love and Beauty | 1 |
| Sally Hansen | 3 | Sinful Colors | 1 |
| Hot Topic | 1 | Sparitual | 1 |
| Sinful Colors | 1 | Pure Ice | 2 |
| Claire's | 4 | | |

Figure 3. Describes how long it takes for the nail polish to chip.

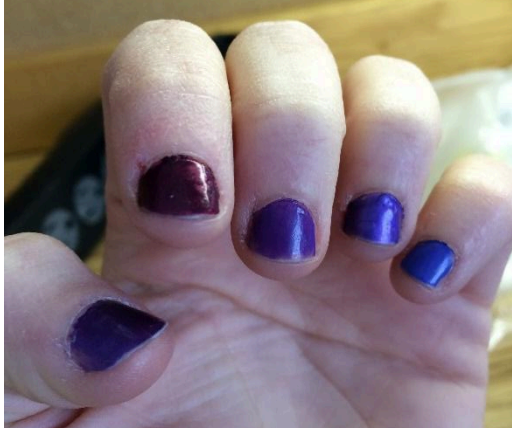
The deterioration of nail polish is documented in the following photographs. A set of photographs for each hand was taken in the morning and evening of each day.

Day 1 Morning:



Day 1 Evening:

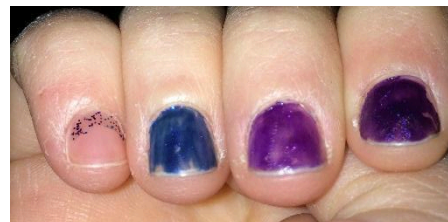




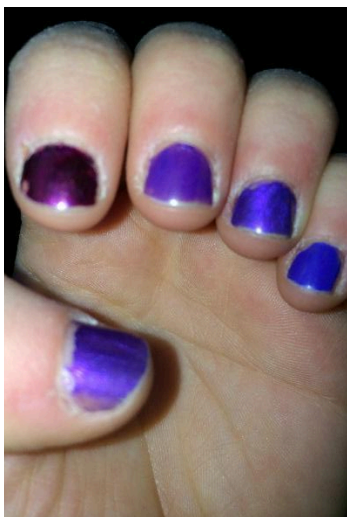
Day 2 Morning:



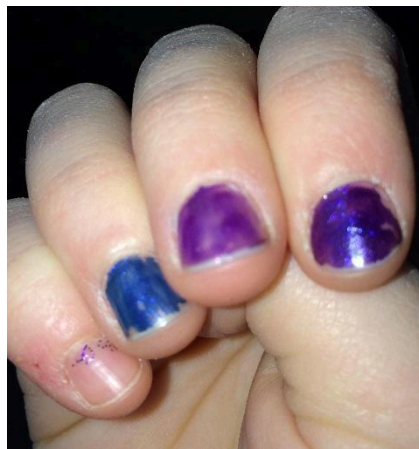
Day 2 Evening:



Day 3 Morning:



Day 3 Evening:



Day 4 Morning:



Figure 4. Shows the progression of natural wear on the nail polish showing pictures from the morning and evening. The left hand is on the left. On the left hand from left to right Wet n Wild (FD), Sally Hansen (Diamond Strength), Hot Topic, Sinful Colors, Claire's. On the right hand from left to right the Pure ICE, Spartial, Sinful Colors, and Love and Beauty.

The nails began to chip around the same time. By the first day all of the nails began to experience surface scratches and thinning of polish except for the Claire's, the Sally Hansen Diamond Strength, and Pure Ice. The Pure Ice, however, was the first polish to come off most of the nail; after the first chip, the polish began to fall off in large pieces. At the end of the Natural Wear Test the polish that came out looking the best was Claire's.

Removability Test

For the Removability Test, the different polishes were applied onto someone's nails using a brush of uniform size for each color in order to minimize differences in the thickness of each coat. After the nails were cleaned up for the aesthetic test and had fully dried, we began the removability test. The Removability Test determined how many swipes it took to fully remove the polish with a makeup removal pad soaked with nail polish remover. In order to be consistent the same remover, type of pad, and amount of acetone applied to the pad were the same. The results are illustrated in Figures Four A and Four B below.



Figure 5 A. Illustrates how many swipes of acetone it took to fully remove polish.



Figure 5 B. Illustrates how many swipes of acetone it took to fully remove each of the sparkling polishes.

Tolerance of Hot Water Test

In order to test how the polishes responded to hot water, we painted fake nails with the polishes for testing and then dipped them in boiling water for 30 seconds holding onto them with a clothespin. We chose boiling water because it is forced to stay at a constant temperature before it can change phase so that all the nails would be subjected to a uniform steady temperature. The result was not entirely unexpected; the fake nails melted, however, many of the nail polishes held up quite well. All of the painted fake nails showed damage around where they were held with the clothespin, which is likely due to the softening of both the fake nails and nail polish in the

boiling water. The sparkly Sinful Colors polish showed barely any damage while other polishes appeared to experience discoloration and pitting of the surface.



Figure 6. Fake nails after being dumped in boiling water. Order from left to right is Wet n Wild (FD), Sally Hansen (Diamond Strength), Hot Topic, Sinful Colors, Claire's, Love and Beauty. Sinful Colors, Sparitual, and Pure ICE.

Resistance to Wear Test

Painted fake nails were used to test the polishes resistance to wear. The nails had a brush vigorously scrubbed against them under both cold and hot water for 30 seconds. No obvious effect was demonstrated on any of the test nails for either of these scenarios therefore this test was dropped.

The painted fake nails were then tested with a nail file. First, the file was used to file the top of the fake nail, which led to a removal of the nail polish from the top edge of the nail, but did not cause any chips in the nail polish. Then, the file was used to score the top of the nail; this simulates a user accidentally having the nail file slip while caring for her nails. The file was run over each nail five times. The Pure ICE polish showed no scratches at all while the Sinful Colors and Wet n Wild polishes only showed only minor scuffs.



Figure 7. Fake nails after being scraped with a nail file. Order from left to right is Wet n Wild (FD), Sally Hansen (Diamond Strength), Hot Topic, Sinful Colors, Claire's, Love and Beauty. Sinful Colors, Sparitual, and Pure ICE.

The fake nails were then scratched with a key, to demonstrate the effect a common household object might have on polish. Much like when tested with the nail file some polishes ended up with only small scratches while others ended up with deep gouges. The Pure ICE nail polish showed the no damage at all and Wet n Wild (FD) and Claire's showed only small scratches from the key.



Figure 8. Fake nails after being scratched with a key. Order from left to right is Wet n Wild (FD), Sally Hansen (Diamond Strength), Hot Topic, Sinful Colors, Claire's, Love and Beauty. Sinful Colors, Sparitual, and Pure ICE.

Price Comparison

Making the decision to paint your nails means choosing which polish to buy. Price is an important factor to take into account when choosing nail polish. The prices of the nail polishes we tested and observed ranged from 1.99 to 12.00 dollars per bottle. However, the price per bottle is not an accurate frame of comparison as the bottles contain different volumes of polish. We took the price and divided by the volume of each nail polish to obtain a price per milliliter. Our results were calculated in milliliters per cent. The cheapest nail polish per milliliter was Sinful Colors. Sparitual was the most expensive of all the brands we tested, going for a price of 80 cents a milliliter (see Figure 9 to see all prices). The pricing data allows us to suggest polish to use in different situations, as the polish you wear to prom is likely more expensive than the polish you might wear on a day to day basis. Furthermore we can determine which polish is the best value, in terms of performance and durability over time. Comparing prices among the data from testing allows our group to be able to determine which polish is the best in each category.

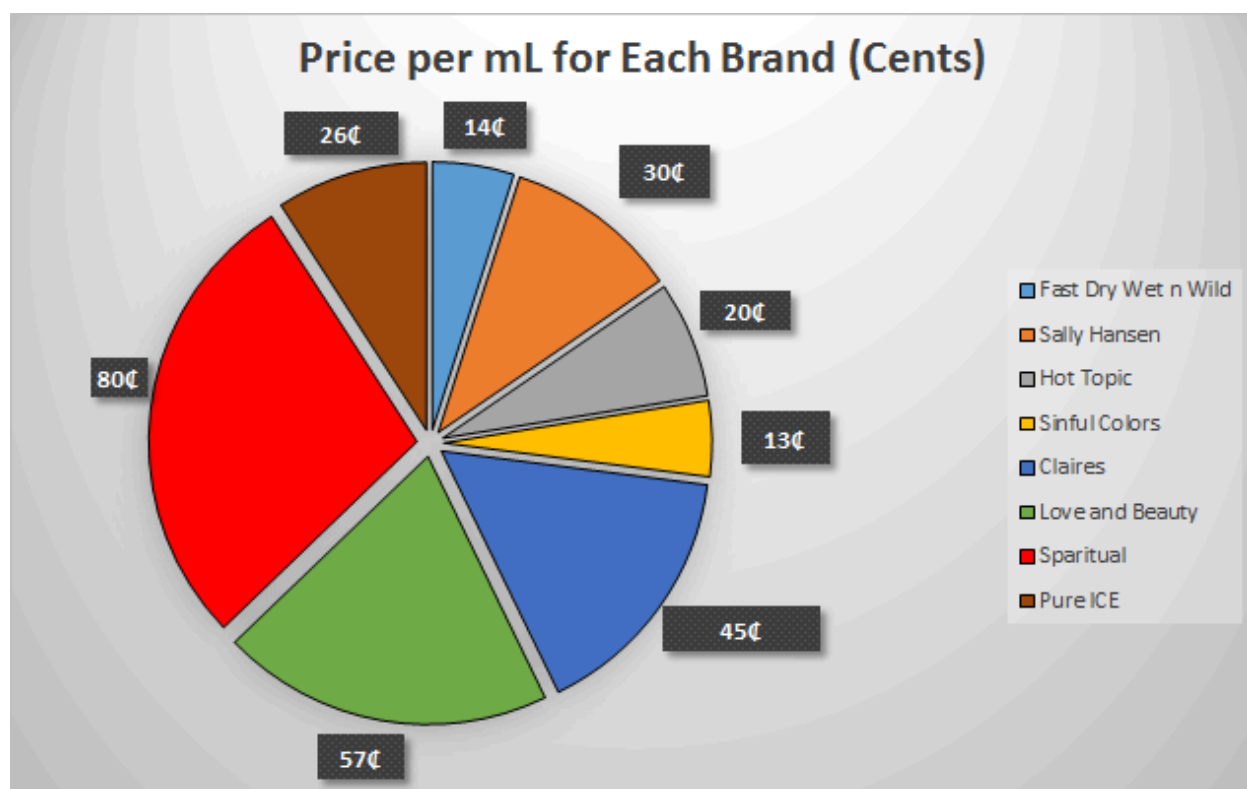


Figure 9. Pie chart price comparison graph of all polishes. The Sinful Colors polishes are included as a single entry as they have the same price.

Results

Analysis of the data obtained leads to the following conclusions. Results from the Drying Test indicates that Claire's brand nail polish dries the fastest at 56 seconds, while the second fastest and third fastest brands to dry were Wet n' Wild Fast Dry and Hot Topic, respectively. On the other hand, Sinful Colors had the best ease of application rating, followed by Sally Hansen, Love and Beauty, and Spiritual. Claire's, Wet n Wild Fast Dry, Sinful Colors had the least amount of wear visible at the conclusion of the collection of Stress Tests. Wet n Wild along with Sinful Color are the cheapest brands, and Sally Hansen scored highest in removability.

Recommendations (for college students)

Overall, we would recommend Claire's brand nail polish for the average college student. It is not the cheapest or easiest to apply, but it is extremely durable compared to the other nail polishes. It also has the fastest drying time, which prevents damage once the nail has been painted.

Conclusion

Some people might feel their nails are naked if they lack a good coat of nail polish. The problem is deciding which nail polish to use. The aim of our project was to provide

recommendations for college students on the best brand of nail polish based on cost, durability, ease of application, ease of removal, and dry time. Analysis of data obtained from the test proves that there is no single brand that has all the best ratings; however, Claire's brand of nail polish has the higher rating overall.