

# Technical Report: Formulating Stronger, More Stable Lipsticks



## Synopsis:

**Floraesters® 15, 20, 30, 60, and 70** [INCI: Jojoba Esters] provide multiple benefits to personal care and cosmetic formulations, including skin hydration, and barrier repair and protection, due to their composition and occlusivity. Floraesters also enhance product shelf life due to their superior oxidative stability. Unlike some “jojoba butter” ingredients, Jojoba Esters are interesterified, not partially-hydrogenated or a mixture of the oil and the wax. This produces esters with only cis-unsaturates and no trans-fats. Jojoba is a wax ester and not a triglyceride oil. Ranging from liquid to soft paste to solid, Floraesters can be utilized within lipstick formulas to achieve the desired hardness, payout, and shine / matte finish.

**Florasun® 90** [INCI: Helianthus Annuus (Sunflower) Seed Oil] is a natural triglyceride oil with excellent emolliency, and superb oxidative stability attributed to its high oleic content of >85% and low levels of polyunsaturates. Florasun 90 can be utilized within lipstick formulas to improve shelf life and prevent rancidity.

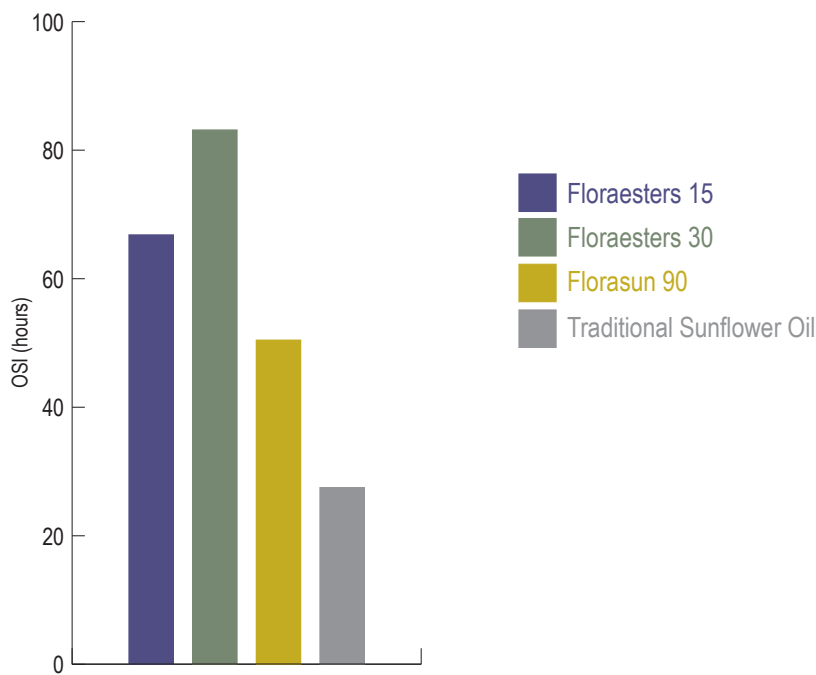
Floraesters 15, 20, 30, 60, 70, and Florasun 90 are Cosmos certified, sustainable, and EU and China REACH compliant.

## Lipstick Formulation Benefits:

- **increased oxidative stability** (Figure 1)
- **increased break strength without increasing hardness and sacrificing payout** (Figures 2-4)
- **decreased syneresis** (Table 1)

## Increased Oxidative Stability in Lipsticks

**Figure 1: Comparative Oxidative Stability Index**



## Methodology:

Lipsticks were formulated with 15% Floraesters 15, Floraesters 30, Florasun 90, or traditional sunflower oil (see Table 2).<sup>1</sup> The oxidative stability index (OSI) of each formulation was determined (Figure 1).<sup>2</sup> The higher the OSI value (hours), the longer the product will remain stable on the shelf.

## Conclusions:

The lipsticks containing **15% Floraesters 15, Floraesters 30, or Florasun 90 resulted in a higher OSI value** than the lipstick with 15% traditional sunflower oil.

For more information about OSI - see [MKT15](#).

1. 15% of each test emollient was used instead of macadamia oil. The formula did not include Floraesters 60, and did include 1% Floraesters 70.  
2. OSI method - AOCs Cd 12b-92

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## Break Strength Methodology:

A fully extended lipstick was moved mechanically at a consistent speed into the detection bar of a Chatillon® Digital Force Meter (Model DFM). The peak compression force required to break the lipstick (n = 3) was determined in kilograms.<sup>3</sup>

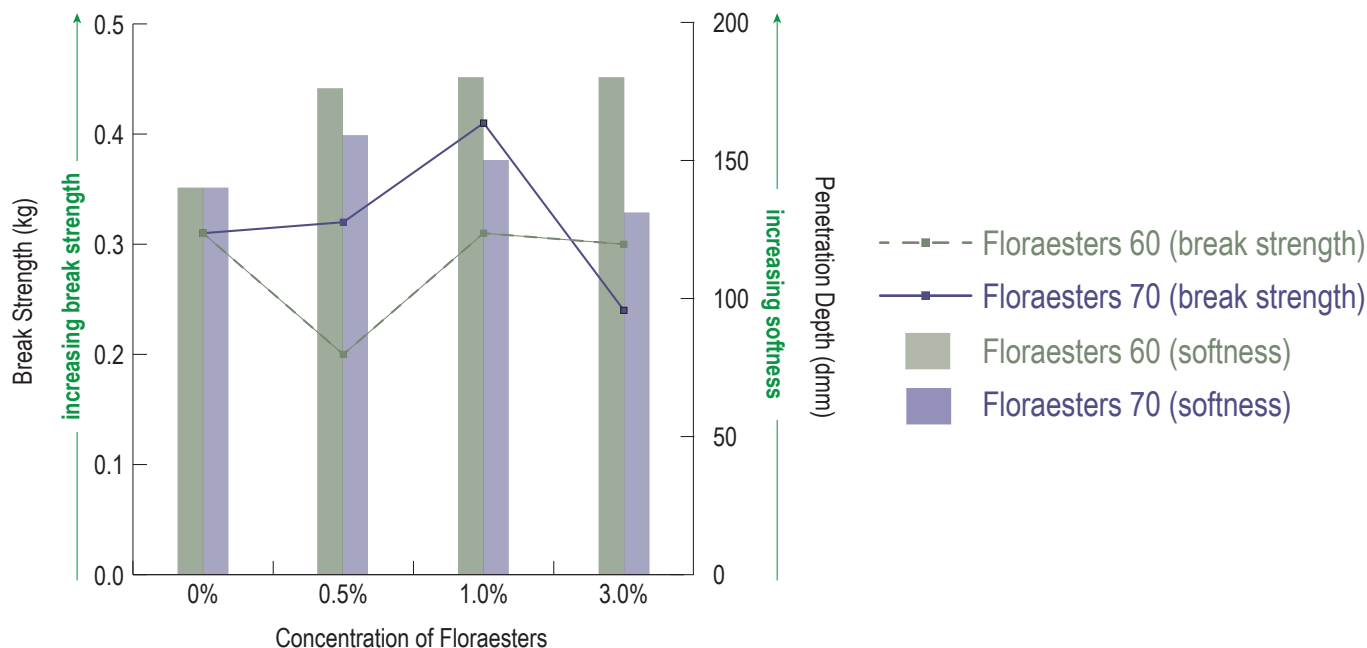
## Penetration Methodology:

The hardness of each formula was tested by means of needle penetration with a penetrometer equipped with a 50g weight. Each formula was melted and poured into a cylinder form to solidify overnight. The needle was placed in slight contact with the smooth surface of the molded wax, then the weight was released. The depth the needle penetrated into the molded wax (n = 5) was recorded in decimillimeters.<sup>4</sup> As penetration increases, hardness decreases (*i.e.* softness increases). Increasing the hardness of a lipstick can decrease payout.

## Increased Break Strength and Decreased Hardness in Lipsticks (caprylic / capric triglyceride oil base)

Lipsticks with a primarily *caprylic / capric triglyceride oil base* (see Table 2) were formulated with varying amounts of **Floraesters 60** or **Floraesters 70** (Figure 2).

**Figure 2: Break Strength & Hardness Control with Floraesters 60 and 70 (caprylic / capric triglyceride oil base)**



## Conclusions:

**1% Floraesters 60 increases softness without decreasing break strength** of lipsticks. **Floraesters 60** can be used to increase payout without losing break strength.

**1% Floraesters 70 increases break strength of lipsticks** without increasing the hardness of lipsticks. **Floraesters 70** can be used to create a more resilient lipstick without decreasing payout.

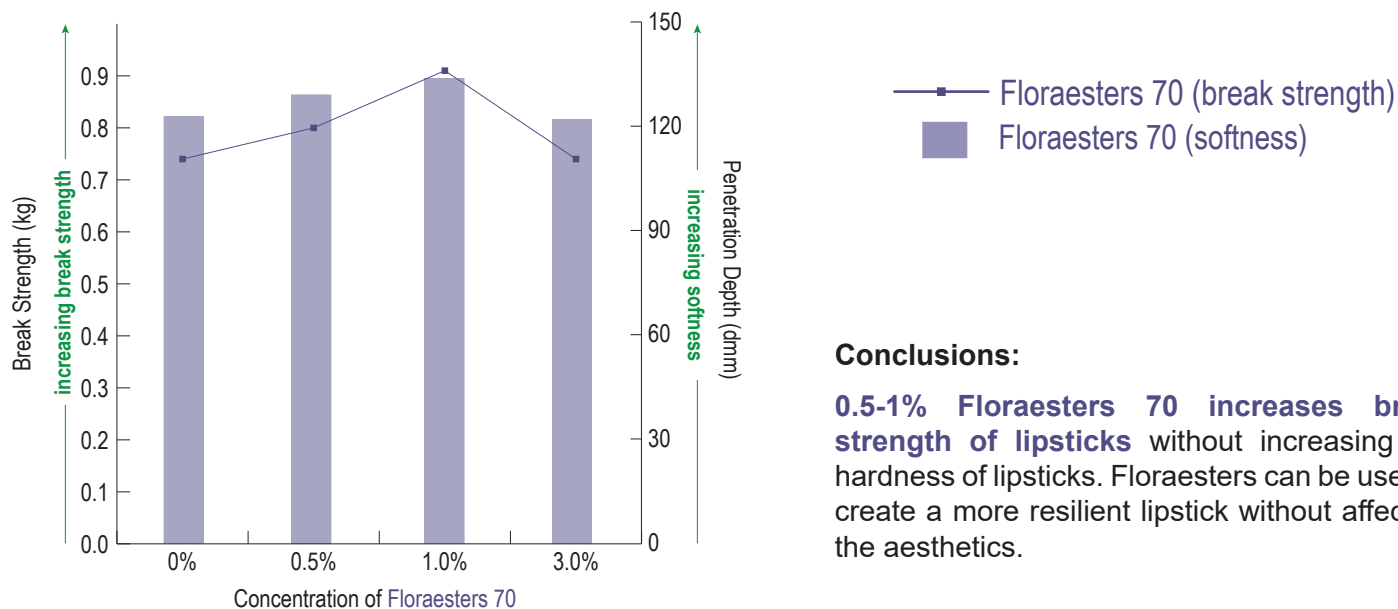
<sup>3.</sup> Work instruction APP14 (Relative Lipstick Strength) available upon request.  
<sup>4.</sup> Work instruction TW29 (Needle Penetration of Solid Waxes) available upon request.

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## Increased Break Strength and Decreased Hardness in Lipsticks (castor oil base)

Lipsticks with a primarily **castor oil base** (see Table 3) were formulated with varying amounts of Floraesters 70 (Figures 4 and 5) or with a combination of **Floraesters 60** and **Floraesters 70** (Figures 3 and 4).

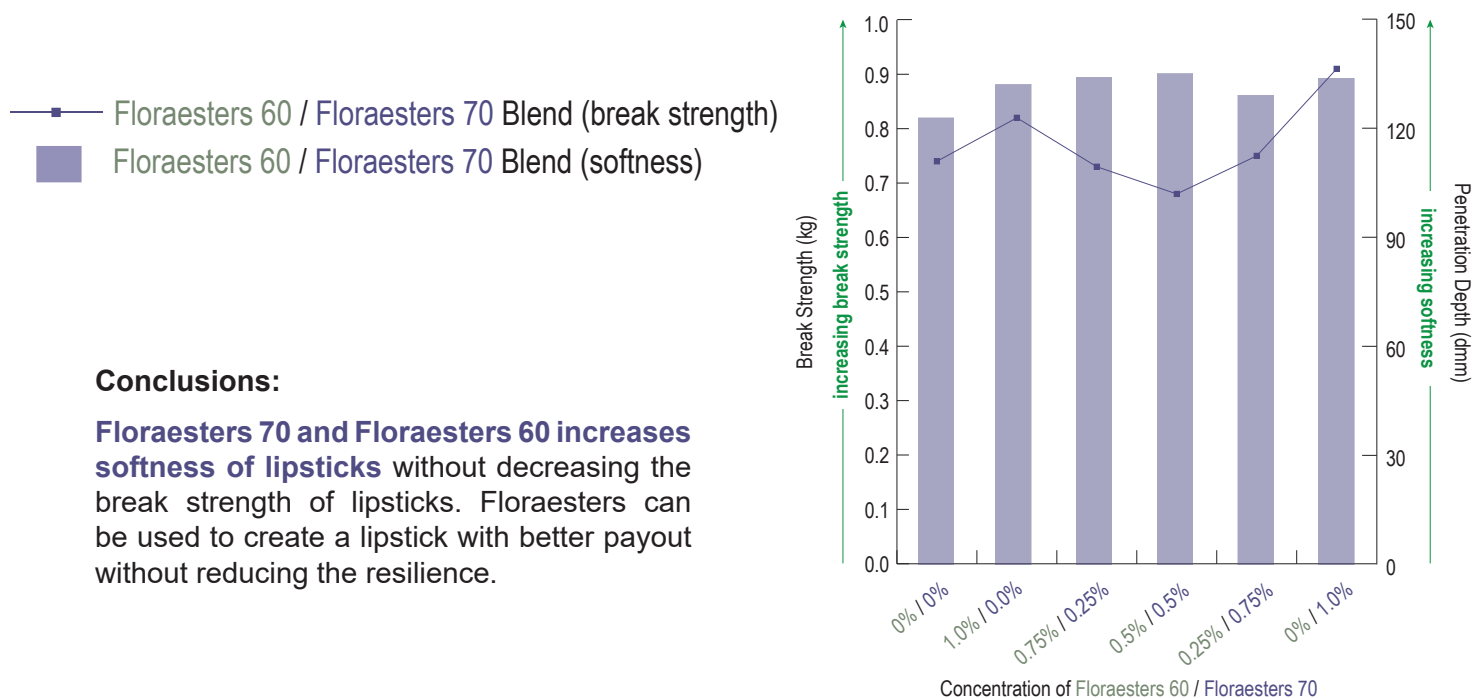
**Figure 3: Break Strength & Hardness Control with Floraesters 70 (castor oil base)**



### Conclusions:

**0.5-1% Floraesters 70 increases break strength of lipsticks** without increasing the hardness of lipsticks. Floraesters can be used to create a more resilient lipstick without affecting the aesthetics.

**Figure 4: Break Strength & Hardness Control with Floraesters 60 and 70 (castor oil base)**



### Conclusions:

**Floraesters 70 and Floraesters 60 increases softness of lipsticks** without decreasing the break strength of lipsticks. Floraesters can be used to create a lipstick with better payout without reducing the resilience.

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## Reduced Syneresis (Sweating) in Lipsticks

### Syneresis Methodology:

Lipsticks with a primarily *caprylic / capric triglyceride oil base* (see Table 2) were formulated with varying amounts of Floraesters 60 (Table 1). The lipsticks were placed in an oven maintained at 43-45°C in an upright position for 4 hours. Lipsticks were evaluated for syneresis upon removal from the oven (immediate) and after cooling to room temperature (2 hours after removal from the oven). Samples were permitted to return to room temperature in order to determine if the oils had reabsorbed. Any appearance of sweating on the lipstick surface was scored on a 0-5 scale (where 0 is no sweating and 5 is heavy sweating).

**Table 1. Syneresis**

| Test Article        | Sweating Score (immediate) | Sweating Score (room temperature) |
|---------------------|----------------------------|-----------------------------------|
| Vehicle             | 5                          | 2                                 |
| 0.5% Floraesters 60 | 5                          | 0                                 |
| 1.0% Floraesters 60 | 5                          | 0                                 |
| 3.0% Floraesters 60 | 5                          | 2                                 |

### Conclusions:

**0.5% Floraesters 60 facilitates the absorption of sweating in lipstick formulas.**

**Table 2. Vehicle Test Lipstick Formula (Caprylic / Capric Triglyceride Oil)<sup>5</sup>**

| Trade/Common Name            | INCI Name                           | Manufacturer       | % wt./wt.                 |
|------------------------------|-------------------------------------|--------------------|---------------------------|
| ----                         | Caprylic/Capric Triglyceride Oil    | ----               | 49.65                     |
| Floramac Macadamia Oil       | Macadamia Oil                       | Floritech          | 15.00                     |
| Floraesters 60               | Jjoba Esters                        | Floritech          | 0.00 - 3.00               |
| Floraesters 70               | Jjoba Esters                        | Floritech          | 0.00 - 3.00               |
| Carnauba Wax T-1             | Copernicia Cerifera (Carnauba) Wax  | Koster Keunen, Inc | 4.34                      |
| Candelilla 204 Wax           | Euphorbia Cerifera (Candelilla) Wax | Koster Keunen, Inc | 5.79                      |
| Beeswax, White               | Beeswax                             | Koster Keunen, Inc | 5.07                      |
| Multiwax W-445               | Microcrystalline Wax                | Sonneborn          | 5.79                      |
| Iscaguard P                  | Propylparaben                       | DeWolf             | 0.10                      |
| Granpowder Silica            | Silica                              | Grant Industries   | 0.20                      |
| Kester Wax K-60P (wax #484B) | Polyhydroxystearic Acid             | Koster Keunen, Inc | 0.20                      |
| ----                         | Titanium Dioxide                    | ----               | 6.50                      |
| ----                         | Red 7 Lake                          | ----               | 3.20                      |
| ----                         | Red 6 Lake                          | ----               | 0.60                      |
| ----                         | Iron Oxide Yellow                   | ----               | 3.50                      |
| ----                         | Tocopherol Acetate                  | ----               | 0.05                      |
|                              | <b>Total</b>                        |                    | <b>100.00<sup>6</sup></b> |

**Table 3. Vehicle Test Lipstick Formula (Castor Oil)<sup>5</sup>**

| Trade/Common Name                               | INCI Name   | Manufacturer                   | % wt./wt.                 |
|---|---|--------------------------------|---------------------------|
| #1 Castor Oil, Standard Liquid #881             | Ricinus Communis (Castor) Seed Oil  | Acme-Hardesty Co.              | 70.20                     |
| Floraesters 60                                  | Jjoba Esters  | Floritech                      | 0.00 - 1.00               |
| Floraesters 70                                  | Jjoba Esters  | Floritech                      | 0.00 - 1.00               |
| Carnauba Wax T-17                               | Copernicia Cerifera (Carnauba) Wax  | Natural Wax                    | 3.00                      |
| 7820 Light Special Candelilla Real <sup>®</sup> | Euphorbia Cerifera (Candelilla) Wax   | Multiceras                     | 4.00                      |
| Beeswax NF Yellow, Wax #421P                    | Beeswax   | Koster Keunen                  | 3.50                      |
| Clarus CSX Microblend 45                        | Microcrystalline Wax  | Clarus Specialty Products LLC  | 4.00                      |
| Microcare OHB                                   | Propylparaben   | Thor Specialties               | 0.10                      |
| Cab-O-Sil <sup>®</sup> M-5                      | Silica  | Cabot Corporation              | 0.80                      |
| Dispersun DSP-OL300                             | Polyhydroxystearic Acid   | Innospec Performance Chemicals | 0.50                      |
| TiO2 LC987 / Castor Oil                         | Titanium Dioxide (and) Ricinus Communis (Castor) Seed Oil (and) Sorbitan Oleate | Sensient Cosmetic Technologies | 8.70                      |
| R7LK LC3075 / Castor Oil                        | Red 7 Lake (and) Ricinus Communis (Castor) Seed Oil                             | Sensient Cosmetic Technologies | 4.30                      |
| Covapate Uniblue LC6721                         | Blue 1 Lake (and) Ricinus Communis (Castor) Seed Oil                            | Sensient Cosmetic Technologies | 0.85                      |
| Covi-Ox <sup>®</sup> T 70 C                     | Tocopherol  | BASF Corporation               | 0.05                      |
|   | <b>Total</b>  |                                | <b>100.00<sup>6</sup></b> |

5. All formulas maintained color and odor over 12 weeks at room temperature and 43°C, and 2 weeks at 50°C.

6. Waxes were removed in equal proportions to accommodate the addition of Floraesters 60 and/or 70.