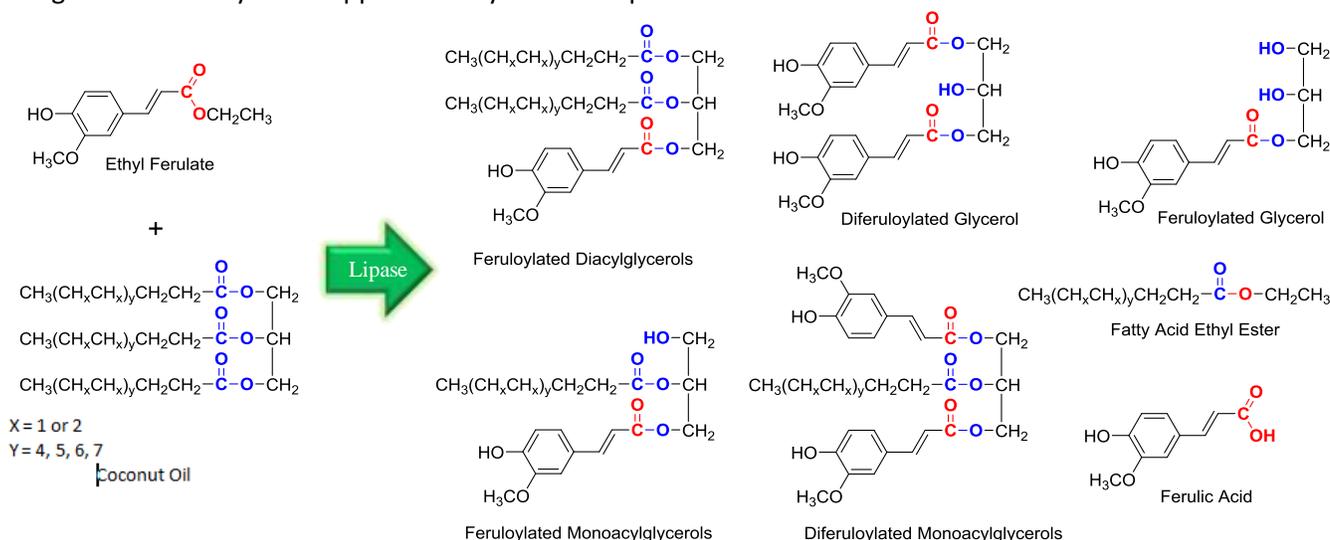




**FCG-33 Information Sheet**  
**(INCI name: coconut oil ethyl ferulate esters)**

Ferulic acid and its derivatives, eg. ethyl ferulate, possess antioxidant and UV-protective properties due to their ability to form stabilized radicals upon exposure to environmental oxidants or UV-radiation<sup>1</sup>. Because of these properties, ferulic acid has recently found its way into cosmetic products and is now combined with commonly used UV-sensitive cosmetic ingredients, such as vitamin E and retinol.<sup>2</sup> It is therefore reasonable to assume that *feruloyl glycerides* derived from ethyl ferulate and a typical triglyceride such as coconut oil, would also exhibit to some degree the same antioxidant and UV-protective properties as ferulic acid and its ester derivatives. As modified oils, these acylglyceride derivatives are more lipophilic in nature and can readily absorb into the skin providing longer-lasting antioxidant and UV-protective effects.<sup>3</sup> Additionally, feruloyl glycerides can easily be formulated to enhance durability (shelf-life), elevate performance and maintain efficacy of other active ingredients in beauty products.<sup>4</sup> These all-natural lipid-based antioxidants<sup>4</sup> can be used as an enhancer in sunscreens, cosmetics, anti-aging skin care and hair care products.

FCG-33 is derived from natural coconut oil and ethyl ferulate utilizing a natural, chemical-free, enzymatic process to afford a mixture of feruloylated glycerols containing zero, one or two acyl (fatty acid) chains of the oil molecules with an average substitution yield of approximately 65%. The process is shown below:<sup>3</sup>



**References:**

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2. See representative product websites: a) <http://www.skinceuticals.com/c-e-ferulic-635494263008.html> b) <http://www.sephora.com/ferulic-acid-retinol-brightening-solution-P375269>
3. Laszlo, J.A.; Compton, D.L.; Eller, F.J.; Taylor, S.L.; Isbell, T.A. Packed-Bed Bioreactor Synthesis of Feruloylated Monoacyl- and Diacylglycerols: Clean Production of a “Green” Sunscreen *Green Chemistry* **2003**, *5*, 382–386.
4. a) Laszlo, J.A. Evans, K.O.; Vermillion, K.E. Appell, M. Feruloyl Dioleoylglycerol Antioxidant Capacity in Phospholipid Vesicles *J. Agric. Food Chem.* **2010**, *58*, 5842–5850. b) Compton, D.L.; Laszlo, J.A.; Evans, K.O. Antioxidant Properties of Feruloyl Glycerol Derivatives *Industrial Crops and Products*, **2012**, *36*, 217–221. c) Compton, D.L.; Laszlo, J.A. 1,3-Diferuloyl-sn-glycerol from the Biocatalytic Transesterification of Ethyl 4-Hydroxy-3-Methoxy Cinnamic Acid (Ethyl Ferulate) and Soybean Oil *Biotechnol Lett*, **2009**, *31*, 889–896.