

The Chemistry of Sunflower Wax

The Source

All sunflower wax starts with the pressing of the dehulled sunflower seed producing an oil. The next step is a heat process to eliminate certain compounds. Depending on the heat employed during the process, the sunflower seed oil can contain a variety of minor compounds, one being the wax. Sunflower seed oil containing wax, is winterized by chilling to 0-10°C for up to twenty-four hours. During this time, crude sunflower wax crystallizes out of the oil and is collected through filtration.

Refinement

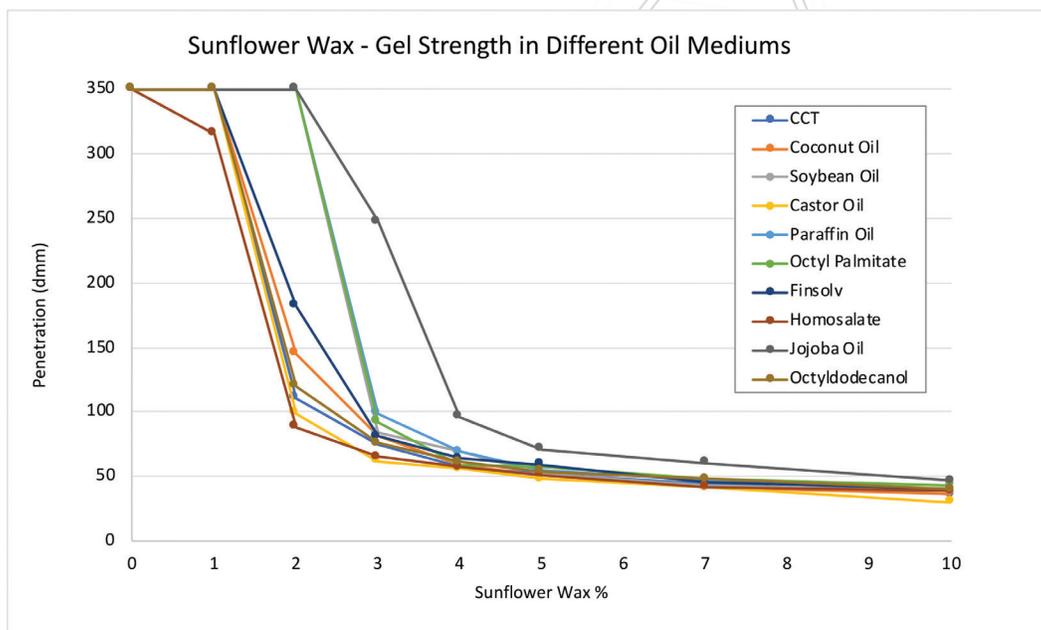
Crude sunflower wax is refined in a variety of methods. The different methods can produce sunflower wax with different chemical properties. Koster Keunen customarily refines sunflower wax to a mixture of monoesters, with carbon chains ranging from C-36 through C-48. The melting point and saponification value specifications are narrow, indicating that the molecular weight distribution of monoesters is also narrow. This narrow molecular weight distribution along with a low free fatty acid level produces a natural wax with unique crystalline properties. Wax crystallinity and a narrow melt point are critical properties that will contribute to gel formation in anhydrous products.



Gel Strength & Measurement

Gel strength is shaped by many factors including the compatibility and solubility of the wax and medium, the chemistry of the wax, and the gel lattice network it forms. Molecular weight distribution of compounds will have a significant effect on the type of gel created. Waxes with a wide molecular weight distribution of compounds and different solidification points will cause inconsistencies in the gel lattice network. Wax crystallization can occur over a range of temperatures which will affect the hardness of the gel. For the most uniform structure, narrow molecular weight distribution will provide stronger gels and structures.

Gel strength is evaluated by measuring the distance traveled by a cone once its vertex pierces the surface of that gel; this is measured in increments of 1/10mm. When reading a gel strength graph, remember the results are inverse. The lower the value the harder the gel, and the higher the value the softer the gel.



Forming Gels with Sunflower Wax

Multiple studies show that Sunflower wax is highly compatible with a wide variety of oil mediums, at all usage levels. Furthermore, sunflower wax will create the hardest gels out of all conventional natural waxes*. The monoesters in sunflower wax are easily solubilized in oils at elevated temperatures, then, as they cool, precipitate out of the oil, forming a solid three-dimensional network. Because the molecular weight distribution and solidification points are narrow, crystallization occurs over a limited temperature range producing an organized gel lattice network. It is this organization that creates the harness of the gel.

*Commercially Available

The chemistry of sunflower wax is why it is used to control gel hardness in all anhydrous systems.

