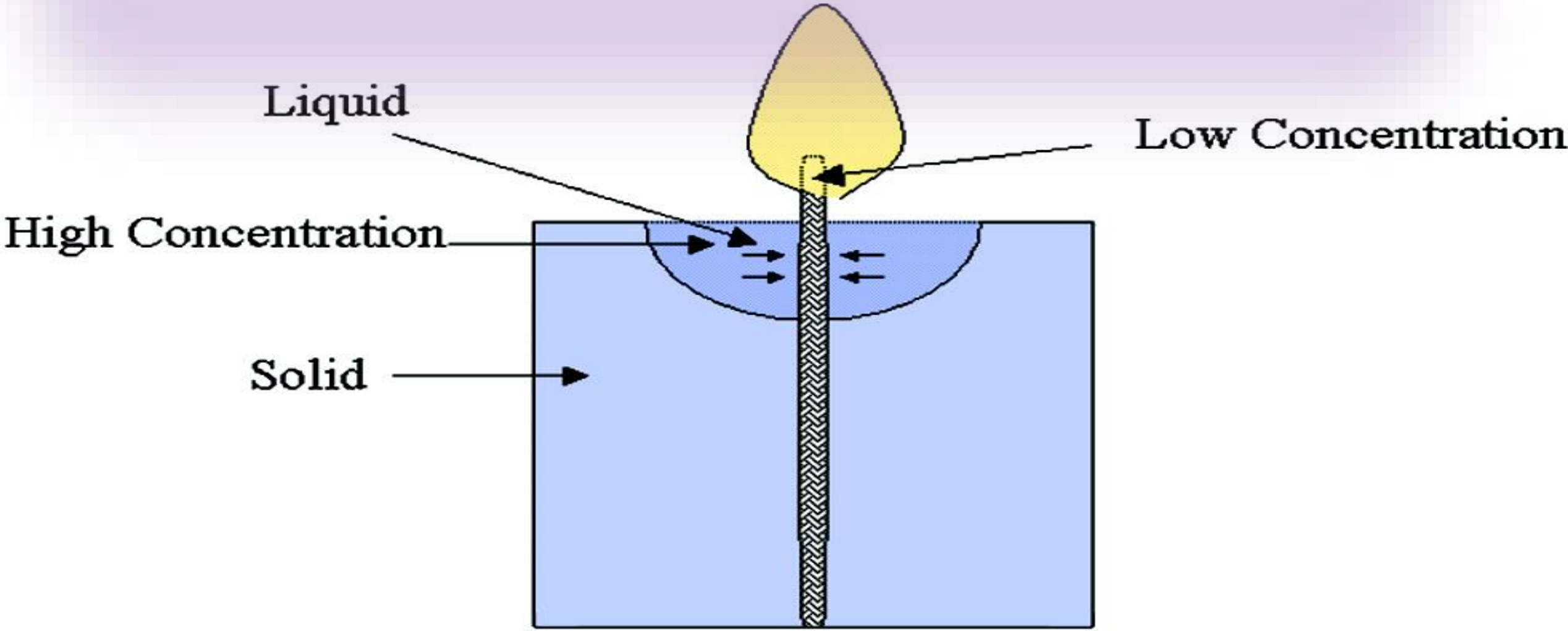
STATEMENT

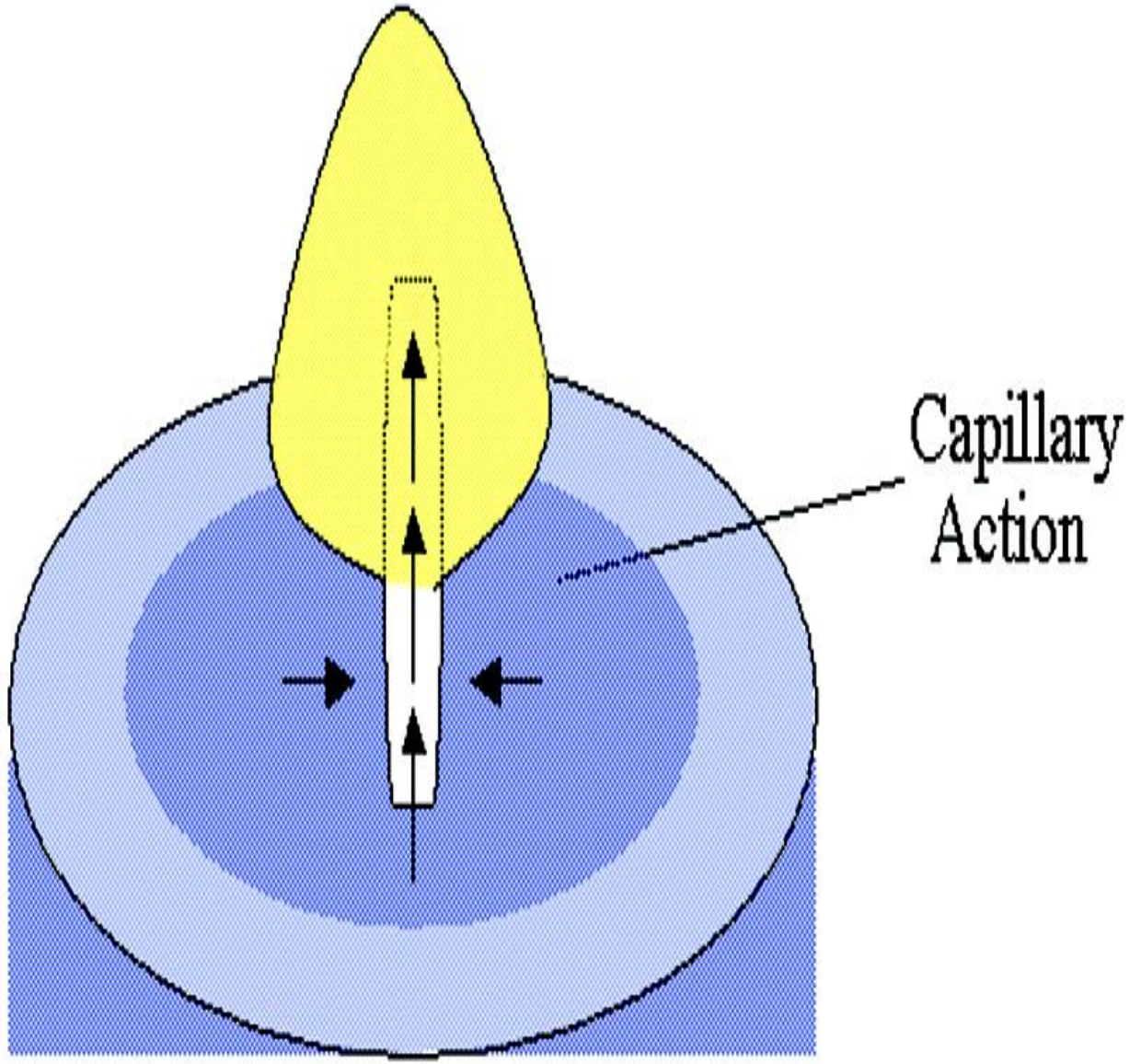
The content of this presentation is proprietary and all information is confidential to Wicks Unlimited a Division of Stimpson Company. It is not intended to promote or judge any of the products tested.

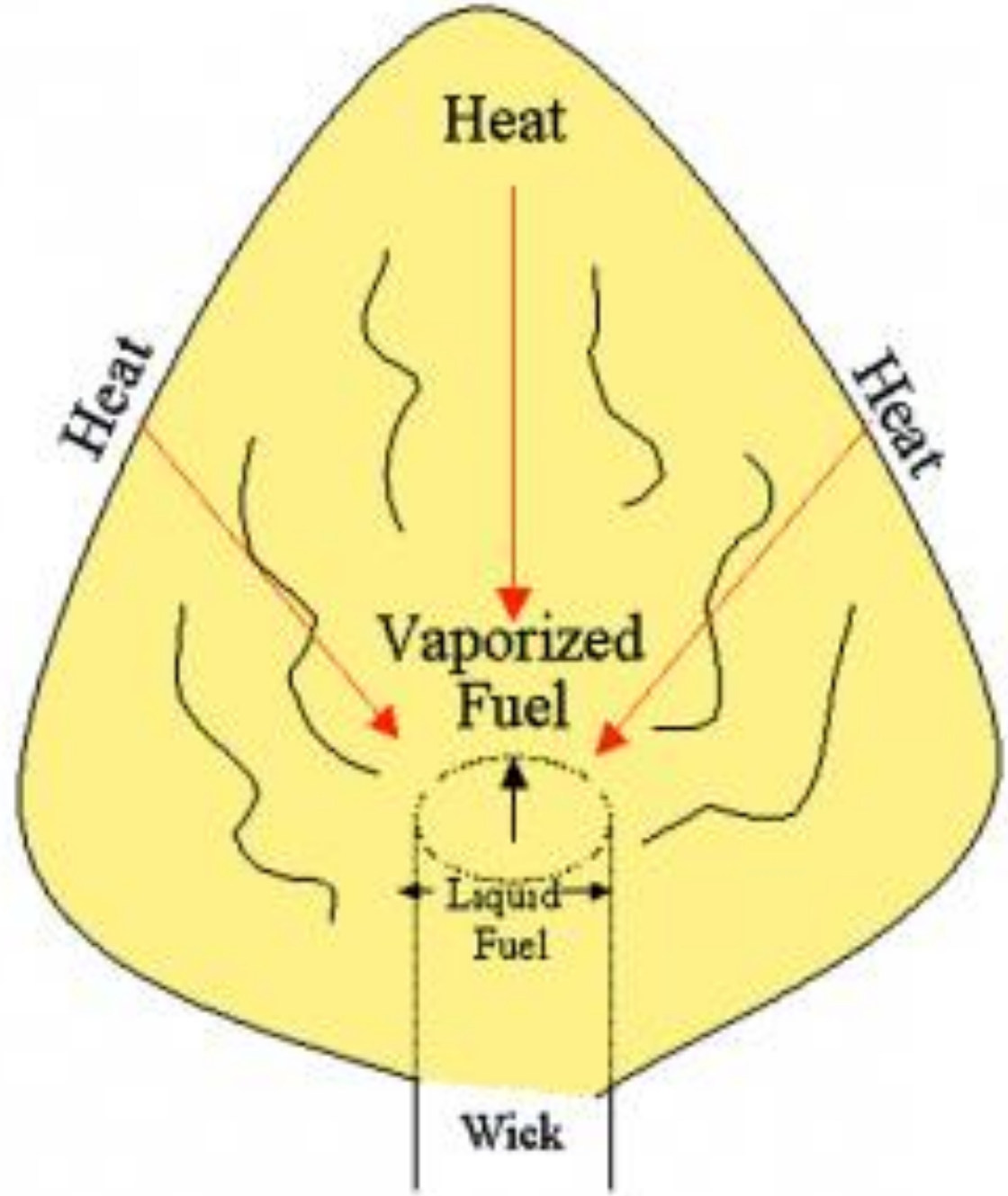
OBJECTIVE

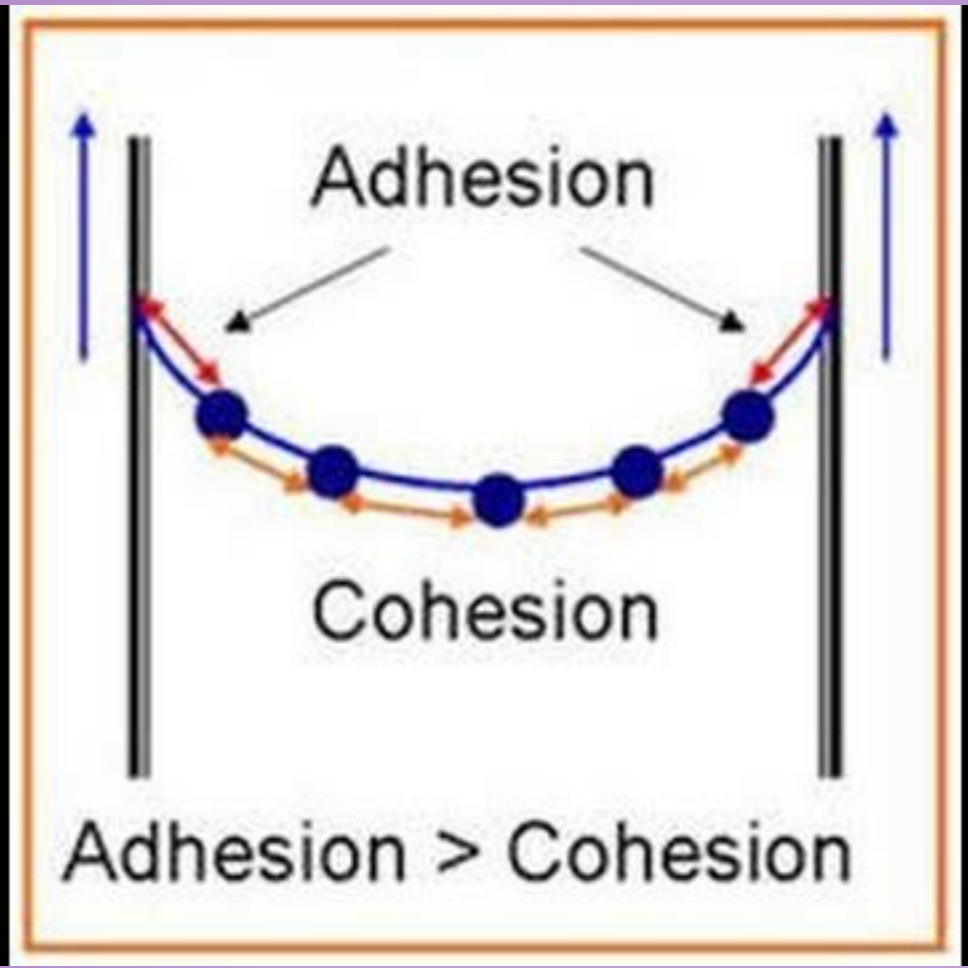
The objective of this presentation is to showcase a similar sized wick by yield (yds./lb.) in four different wick constructions and how much the burning performance varies in 50/50 blend,100% paraffin, and 100% soy.

BRIEF DESCRIPTION OF A WICK PROPERTIES

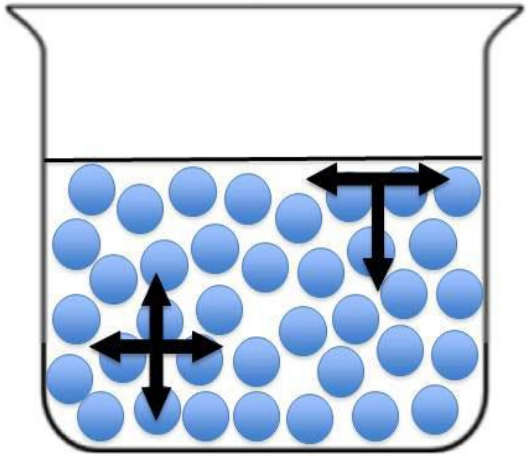



Capillary
Action


Heat
Heat
Heat
Vaporized
Fuel
Liquid
Fuel
Wick



Surface Tension



Molecules in the interior of a liquid are attracted in all directions, but molecules at the surface have a net inward attraction that results in surface tension.

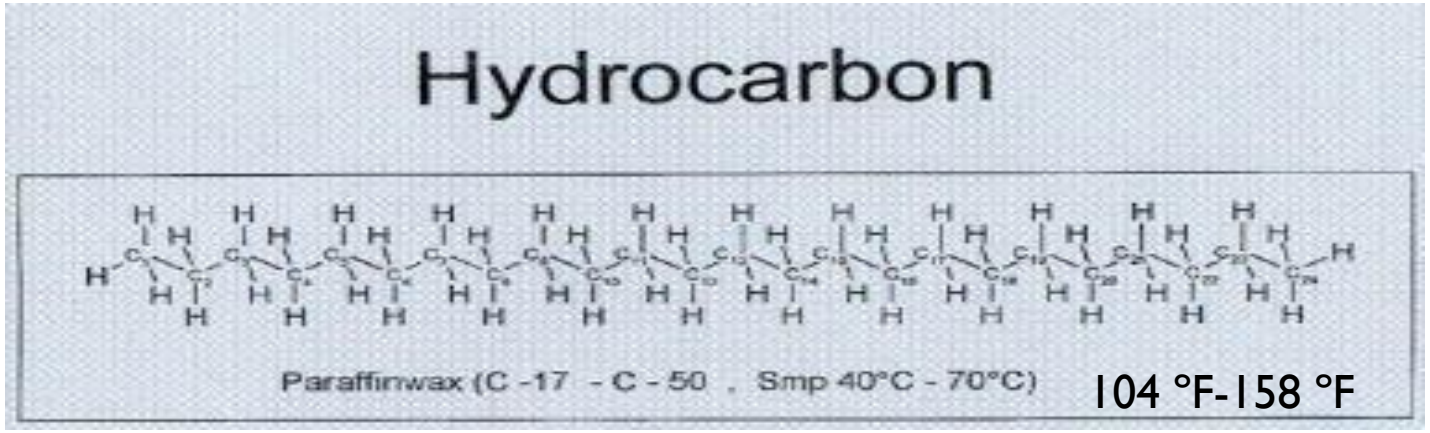
BRIEF DESCRIPTION OF WAX CHEMISTRY

In the candle industry we mostly deal with hydrocarbon molecules of 17 carbons or more. The higher the number of carbon atoms, the higher the surface to surface contact area which allows more intermolecular forces to form. Hence the increase in viscosity, melting points, and boiling points with the increase in molecular mass.

DIFFERENT TYPES OF WAXES

Paraffin:

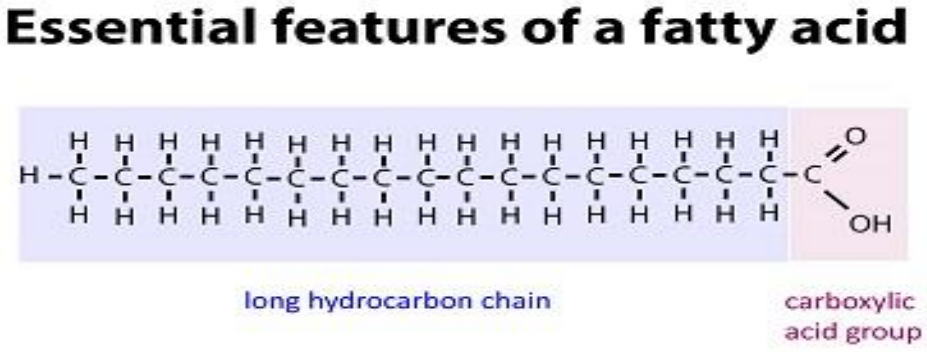
It is derived from petroleum and consists of long chain hydrocarbons, also known as alkanes. This has a higher melt-point compared to vegetable waxes.

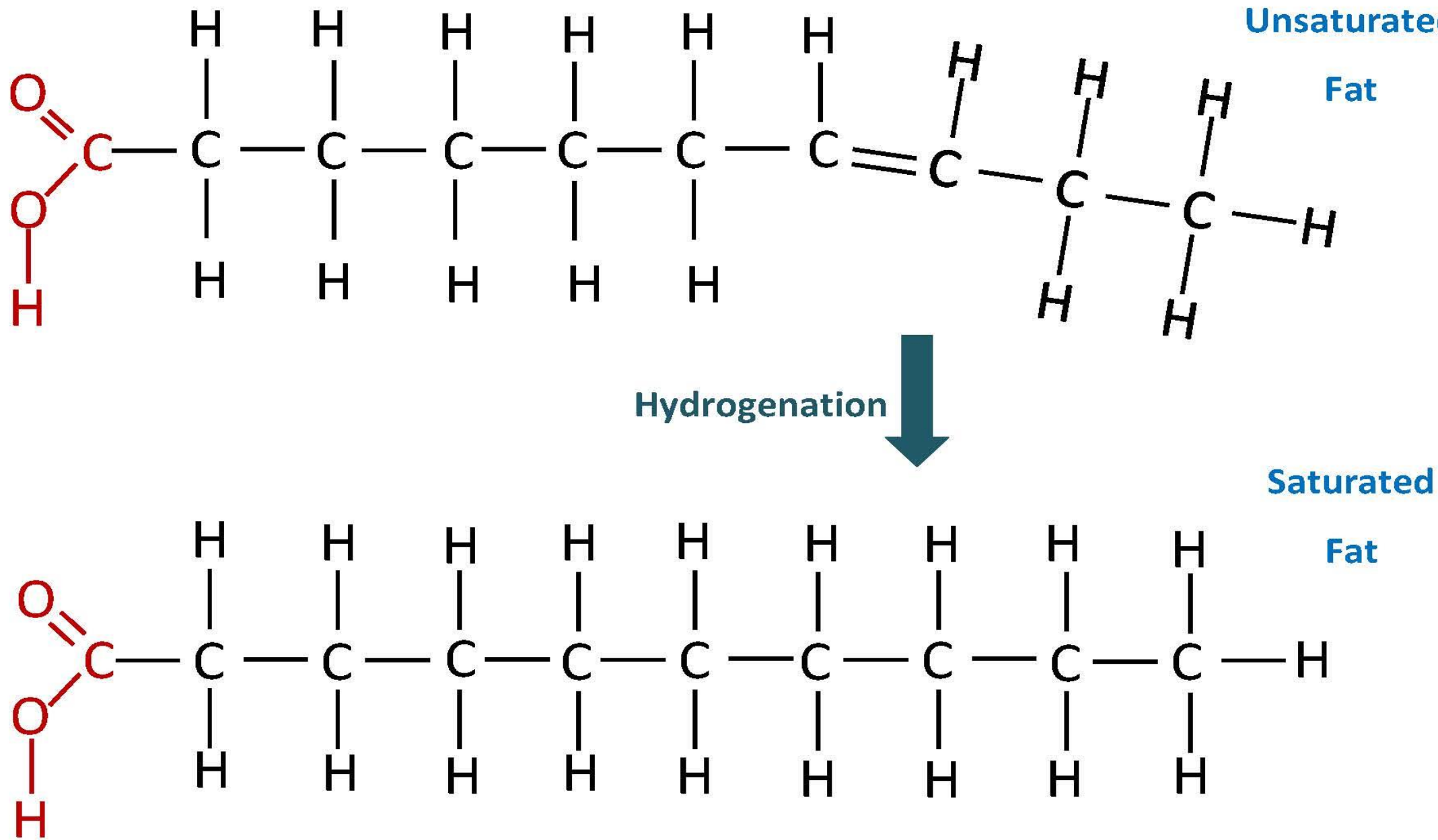


DIFFERENT TYPES OF WAX

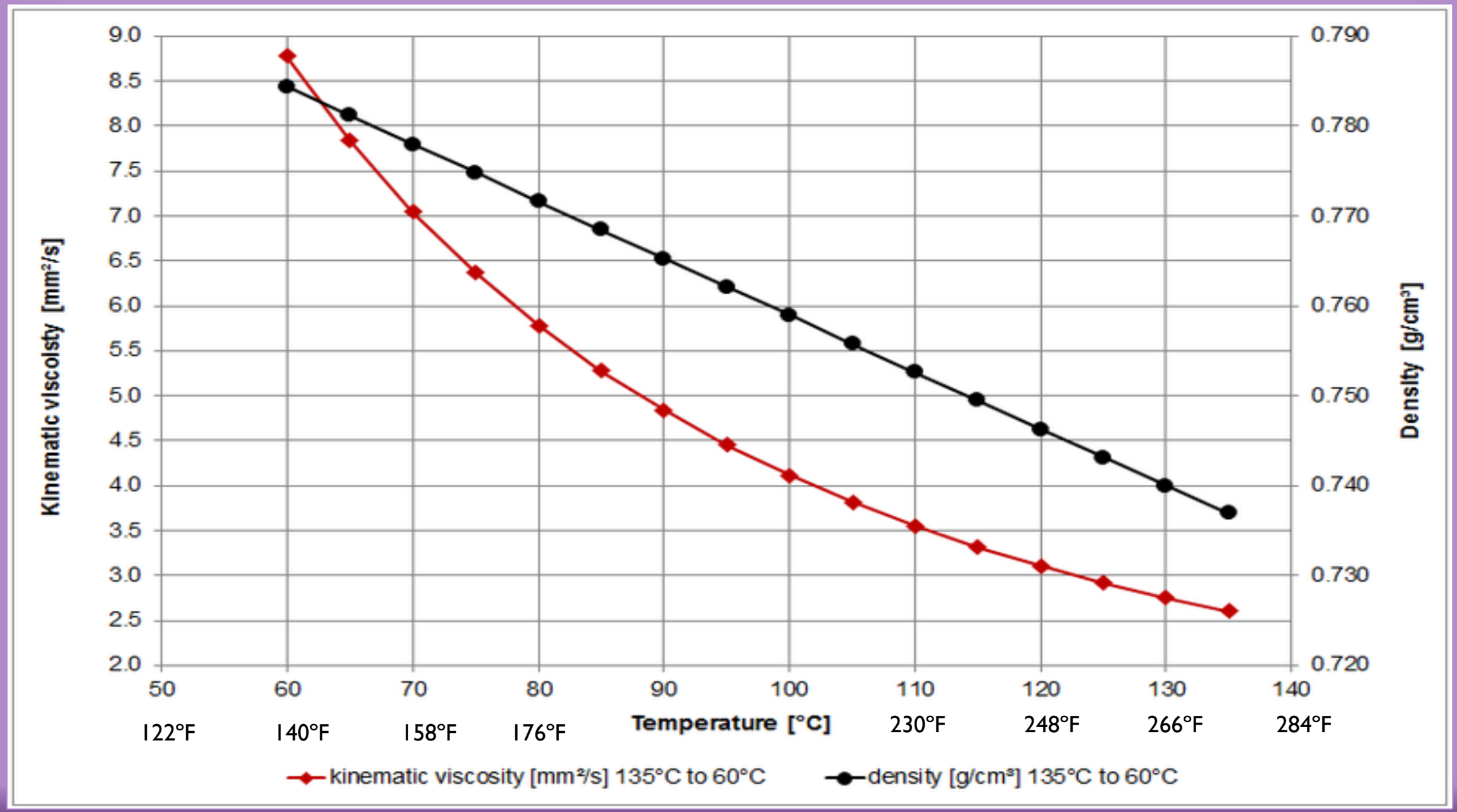
Soy Wax:

It comes from the soy bean plant. The oil is extracted from the beans and goes through a hydrogenation process that converts some of the fatty acids in the oil from unsaturated to saturated. This process changes the molecular structure and hence it's physical characteristics, so it goes from an oil, to a solid at room temperature.




Unsaturated
Fat
Hydrogenation
Saturated
Fat

Paraffin Candle Wax - Kinematic Viscosity and Density Over Temperature



SUMMARY OF EXPERIMENT

1. Four different types of cotton wick construction (flat braid, square braid, cotton core, and twisted) with similar sizes (yards/pound). They were all process using the same waxing procedure.

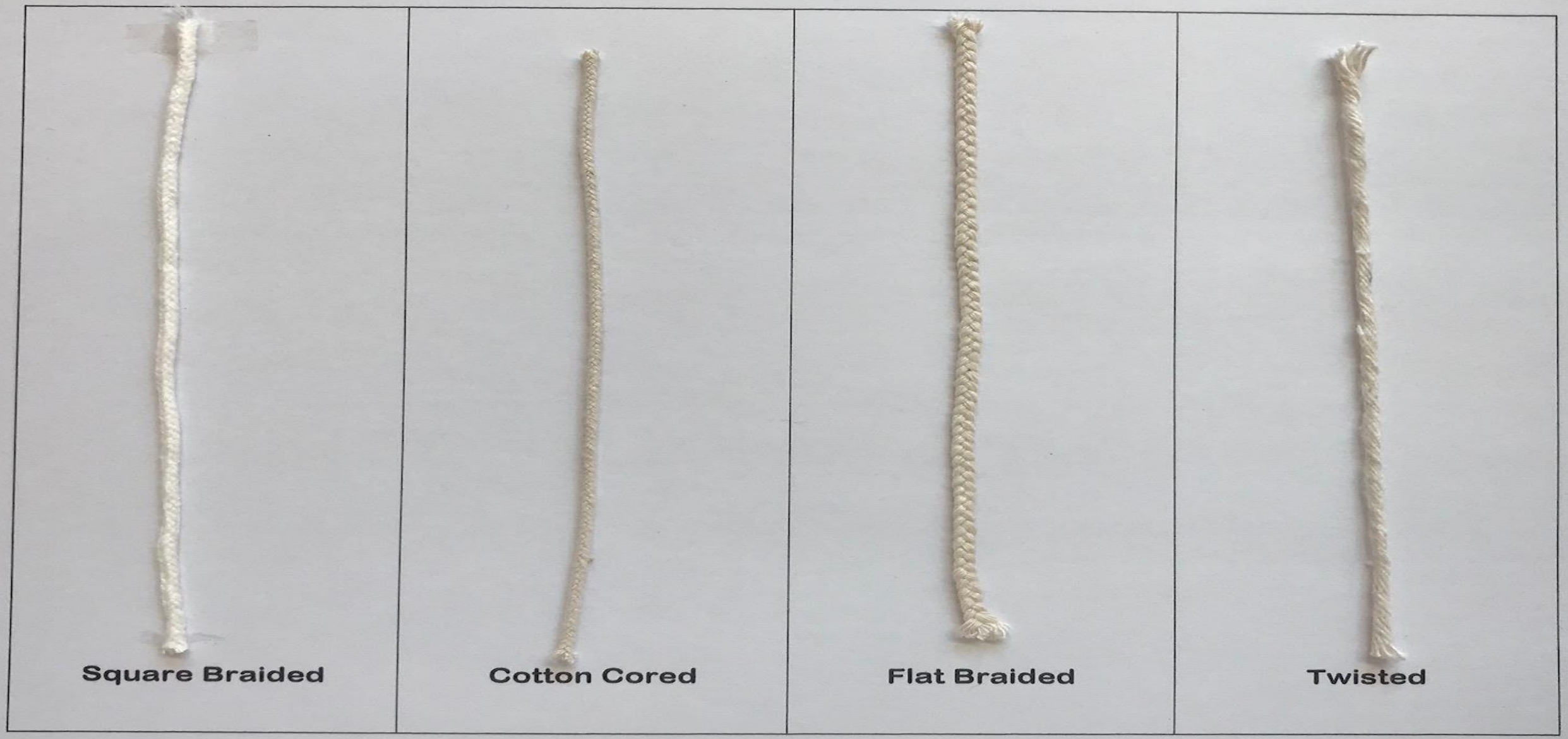
2. 100% paraffin wax (melt point 139 F°), 100% soy wax (melt point 115 F°) and 50:50 blend of paraffin/soy.

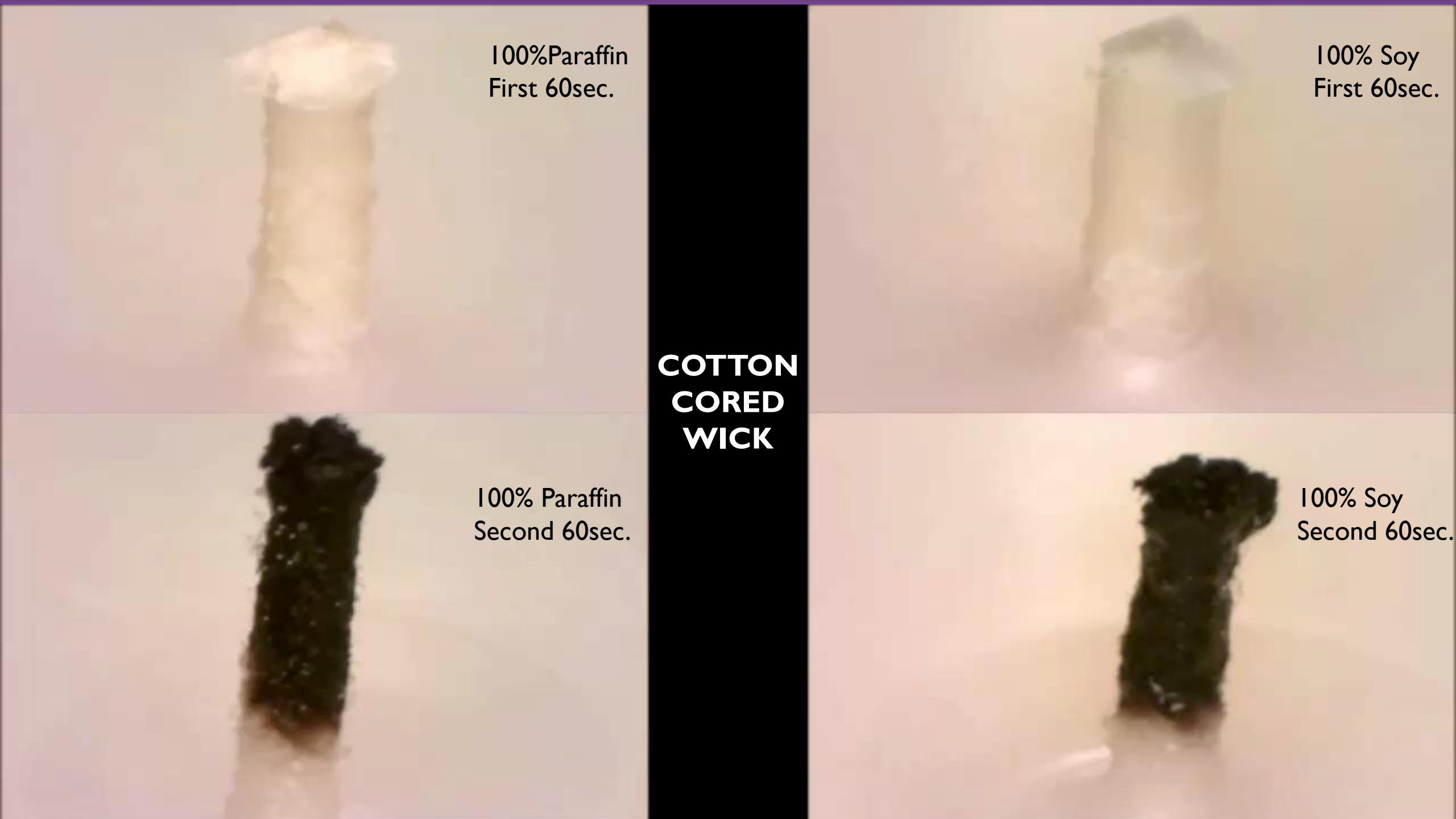
Note: All candles were made with no additives, fragrance or colors to eliminate any variables.

Wicks were processed the same way.

3. Tested for flame height, heat distribution, video microscopic wick behavior, IR average melt pool temperature, and ROC.

4. Visual 60 second videos to compare different wick burning characteristics.


Square Braided
Cotton Cored
Flat Braided
Twisted


100%Paraffin
First 60sec.
100% Soy
First 60sec.
COTTON
CORED
WICK
100% Paraffin
Second 60sec.
100% Soy
Second 60sec.

100%Paraffin
First 60sec.

100% Soy
First 60sec.

FLAT BRAID WICK

100% Paraffin
Second 60sec.

100% Soy
Second 60sec.

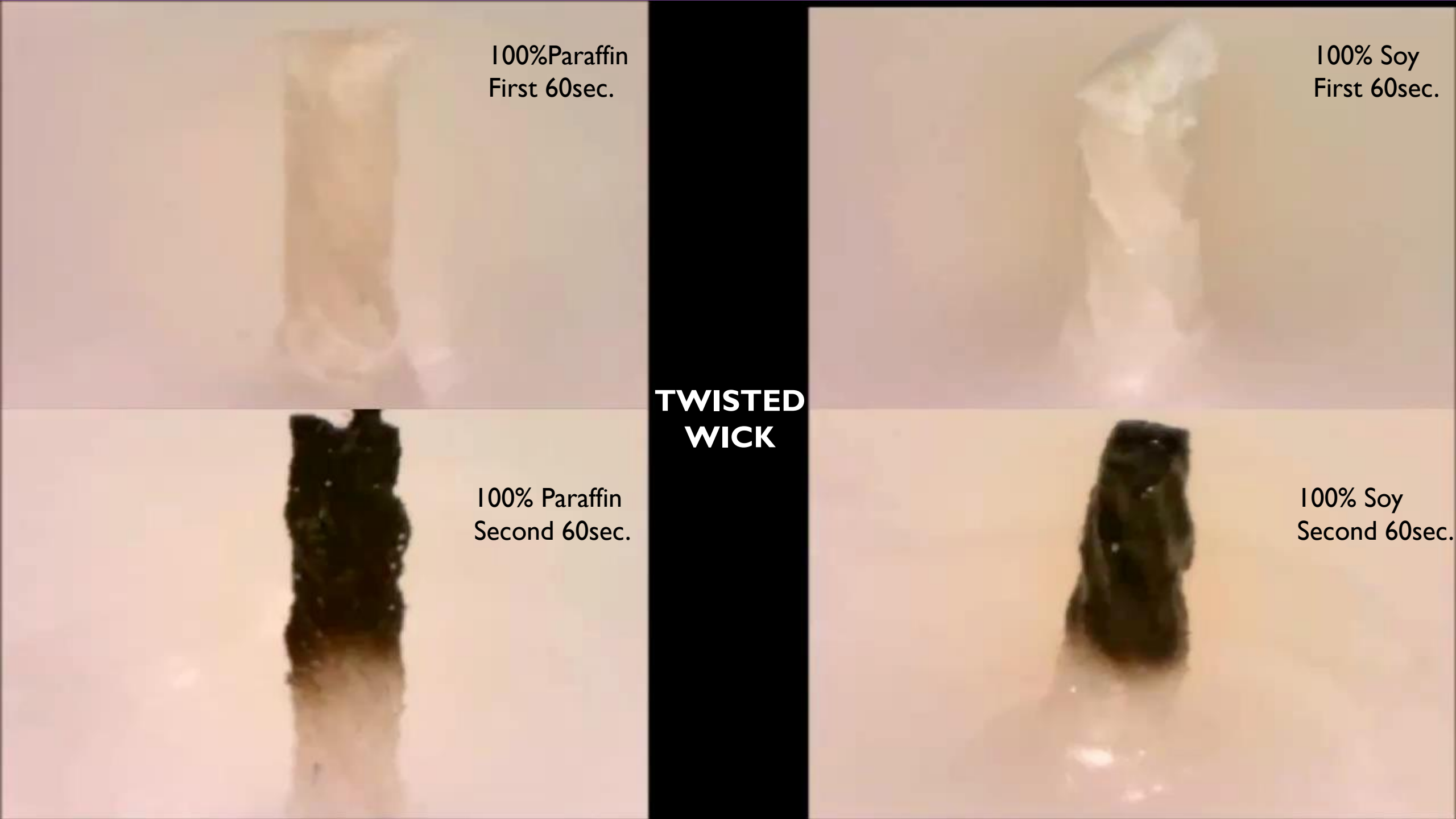
100%Paraffin
First 60sec.

100% Soy
First 60sec.

SQUARE BRAID WICK

100% Paraffin
Second 60sec.

100% Soy
Second 60sec.


100%Paraffin
First 60sec.
100% Soy
First 60sec.
TWISTED
WICK
100% Paraffin
Second 60sec.
100% Soy
Second 60sec.

100% Paraffin **Cotton Core Wick** 100% Soy

100% Paraffin **Flat Braid** 100% Soy

100% Paraffin

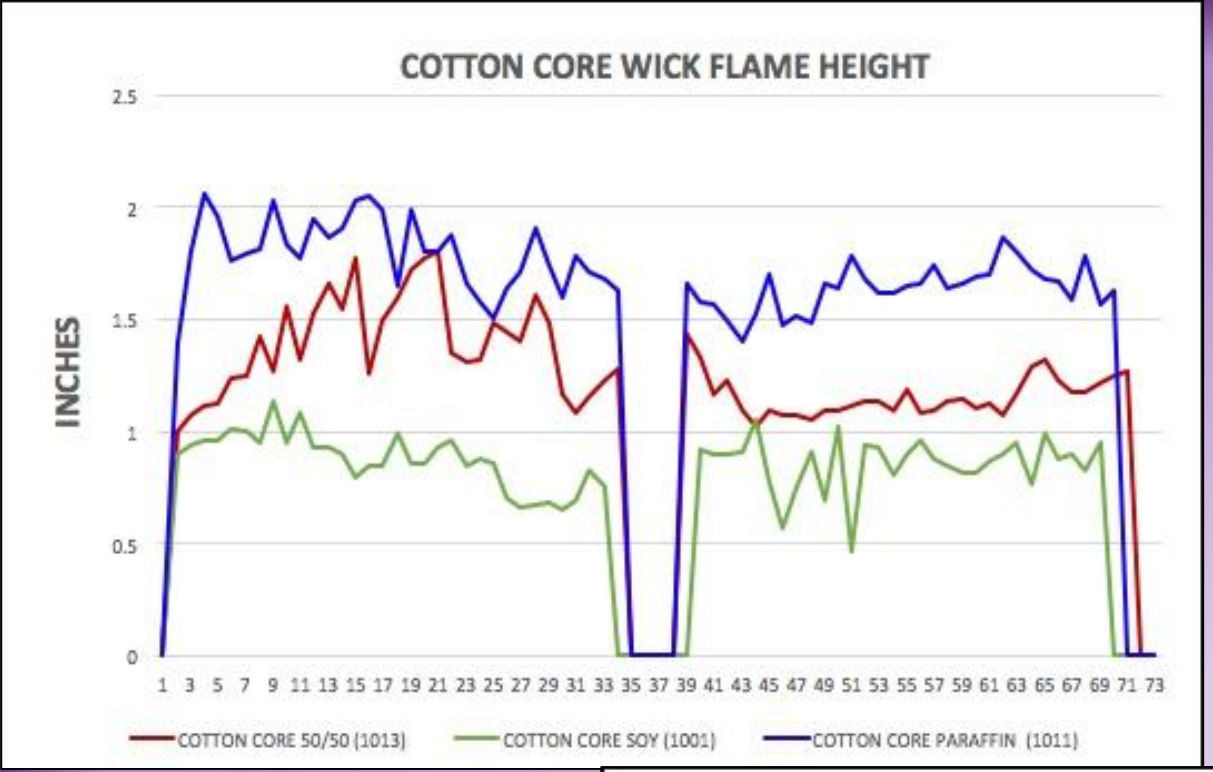
Square Braid

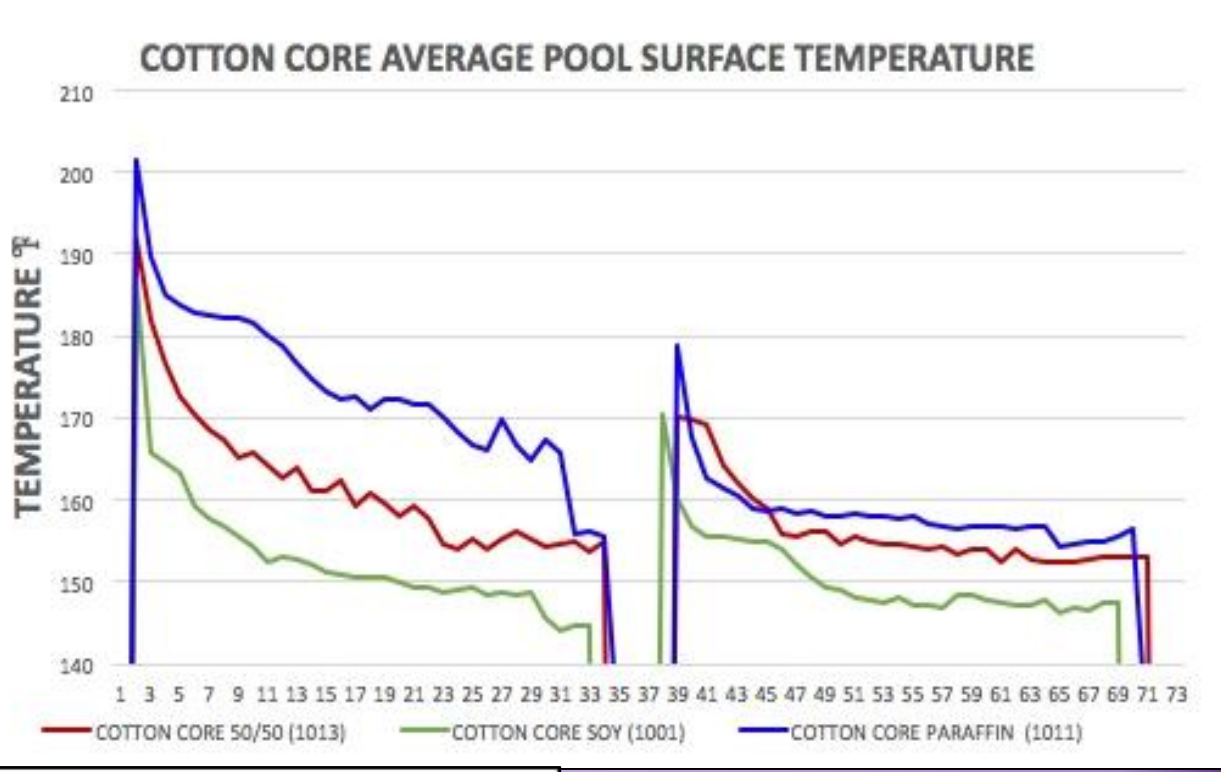
100% Soy

100% Paraffin

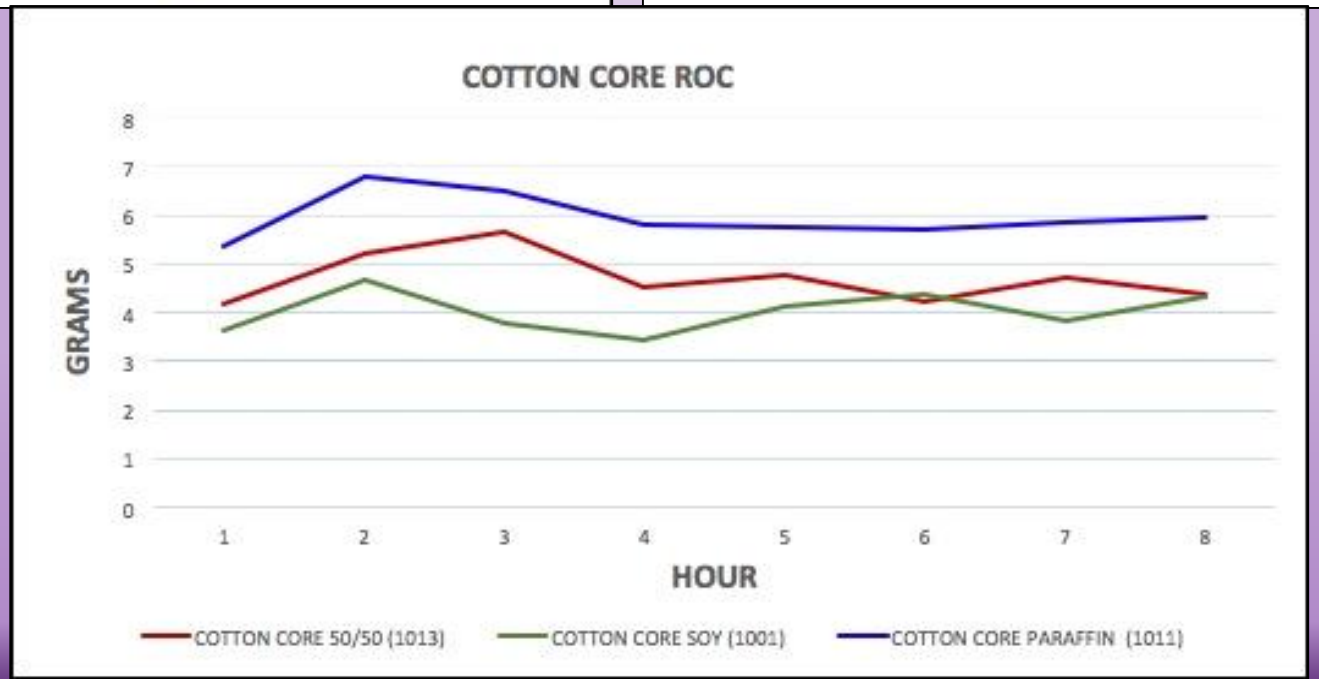
Twisted Wicks

100% Soy





100% Paraffin: Blue
100% Soy: Green
50/50 Blend: Red



100% Paraffin: Blue
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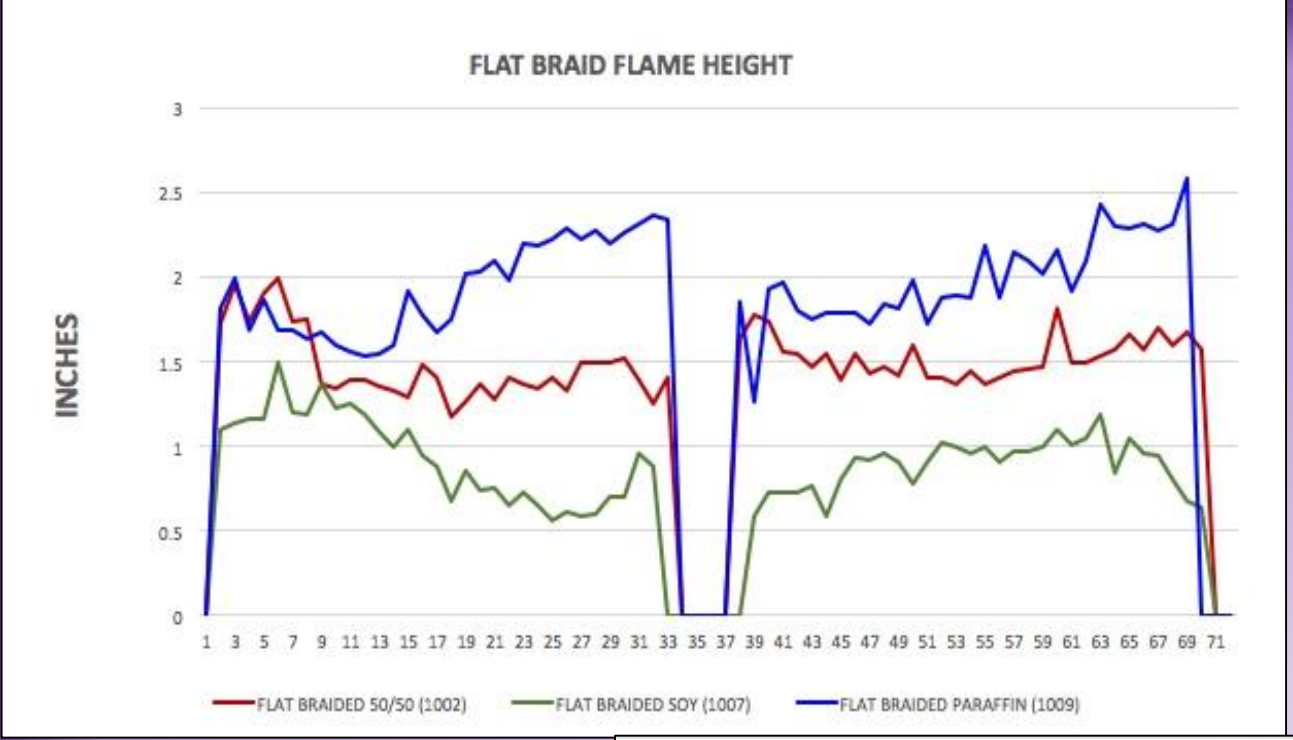
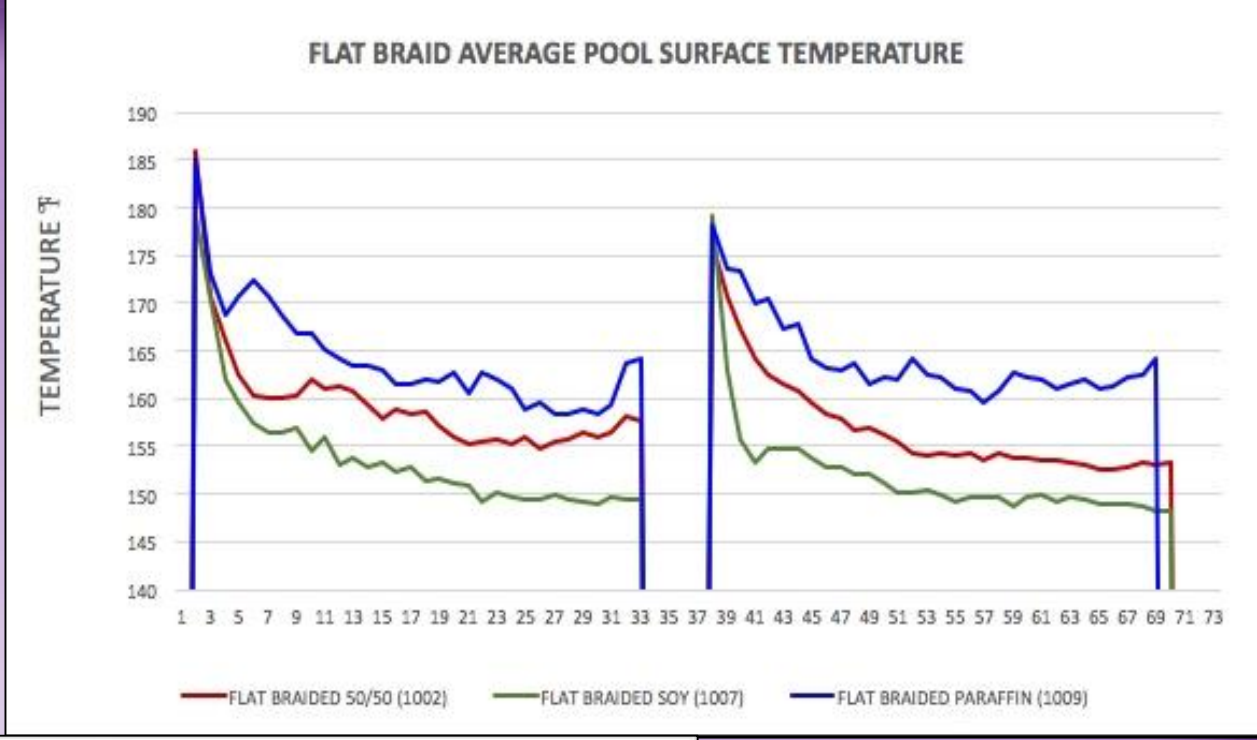
50/50 Blend: Red





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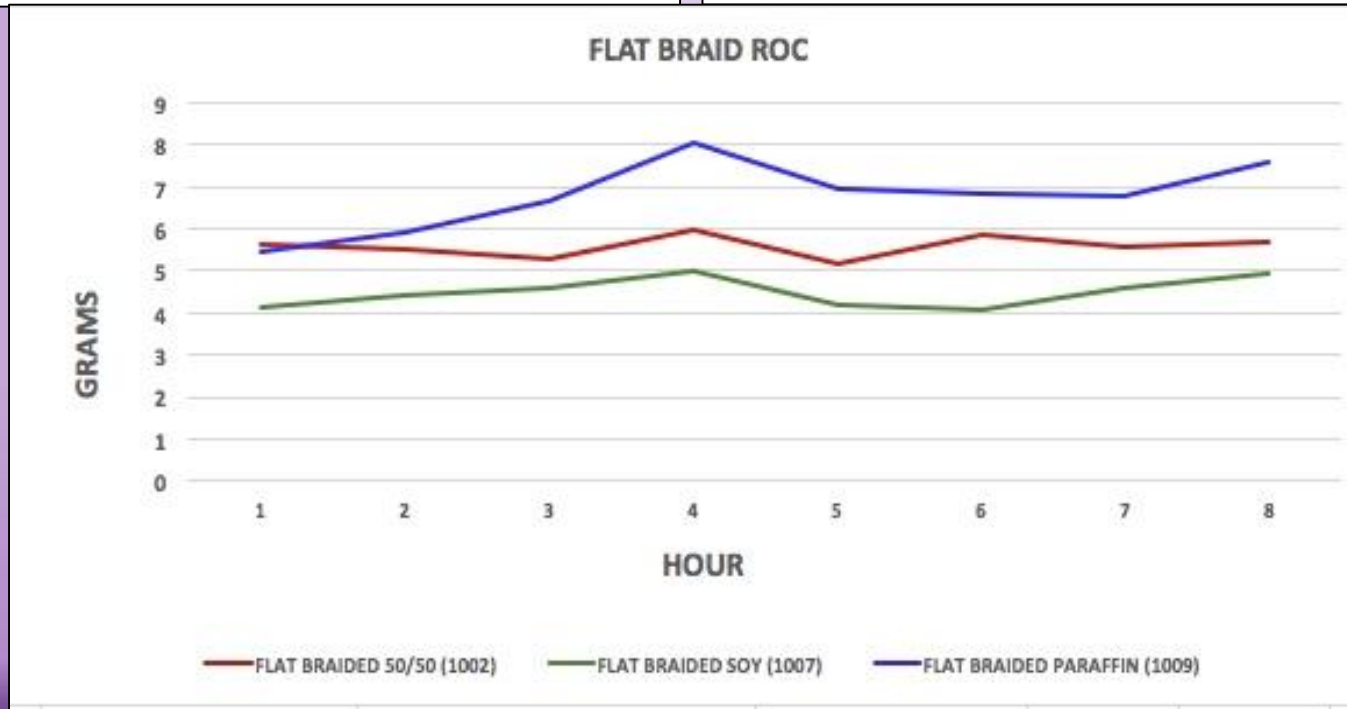
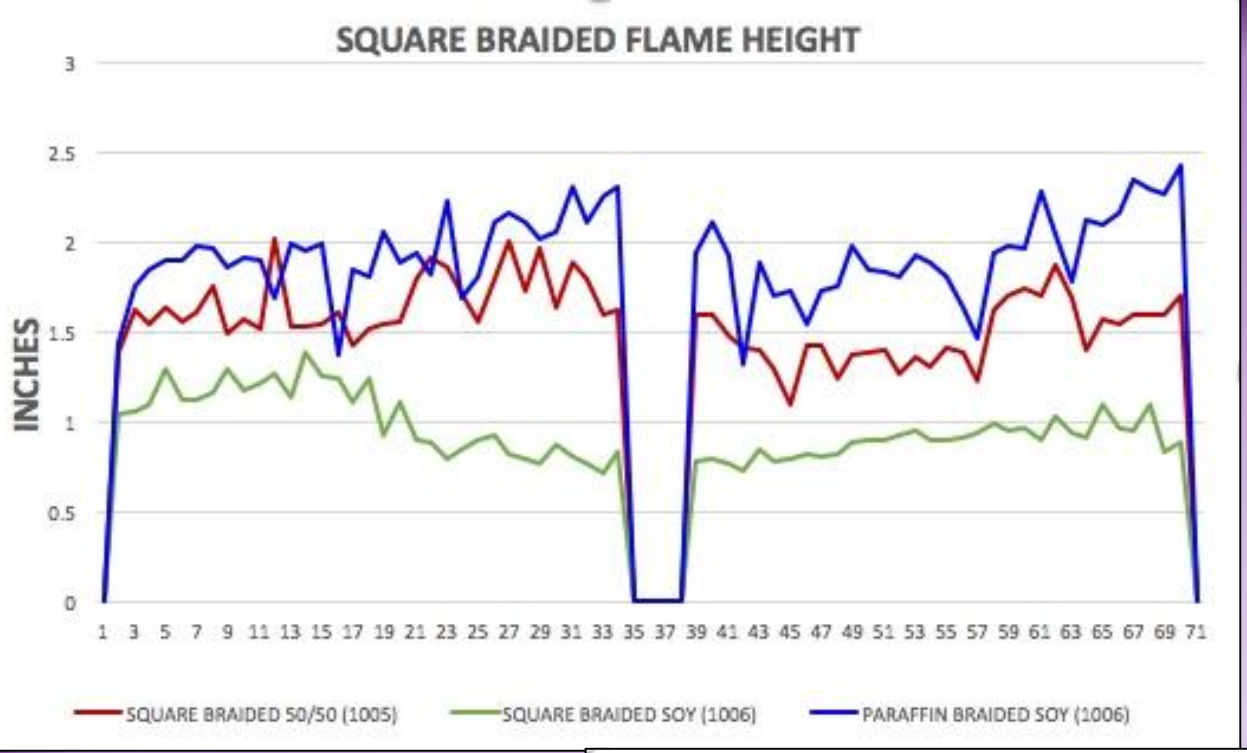
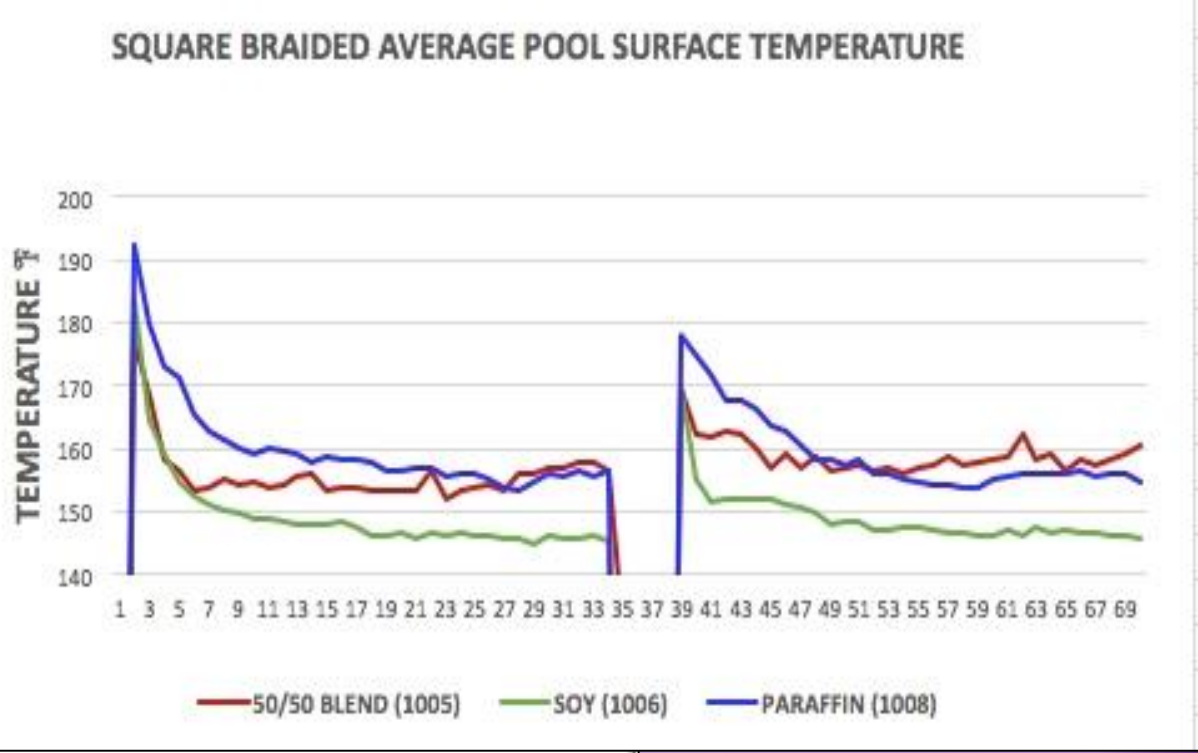
100% Soy: Green
50/50 Blend: Red

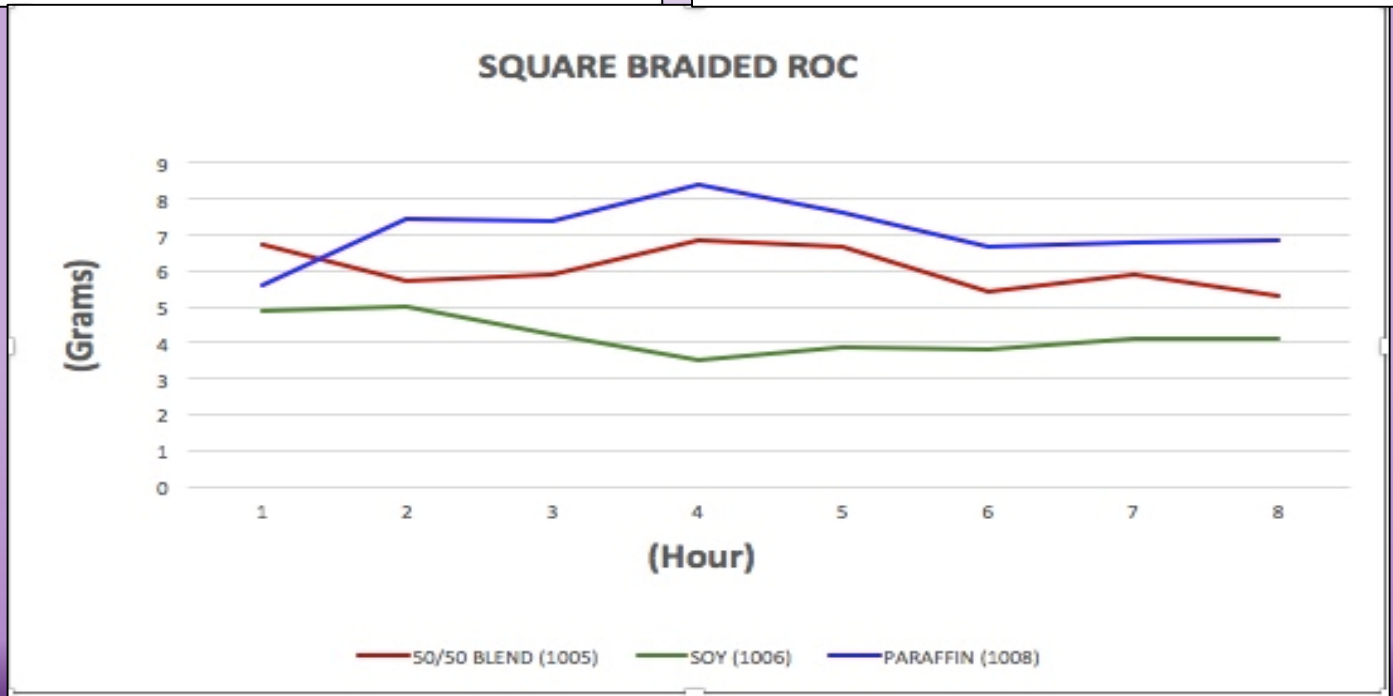


100% Paraffin: Blue
100% Soy: Green
50/50 Blend: Red

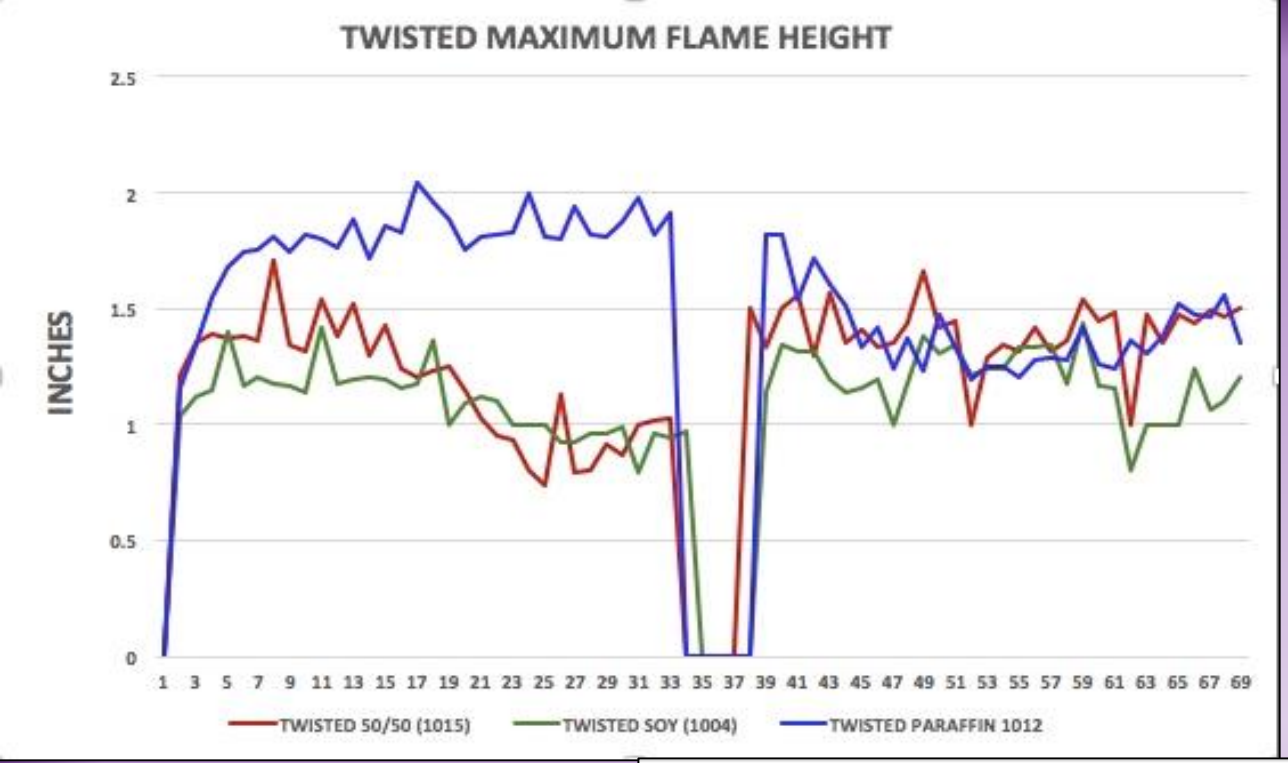


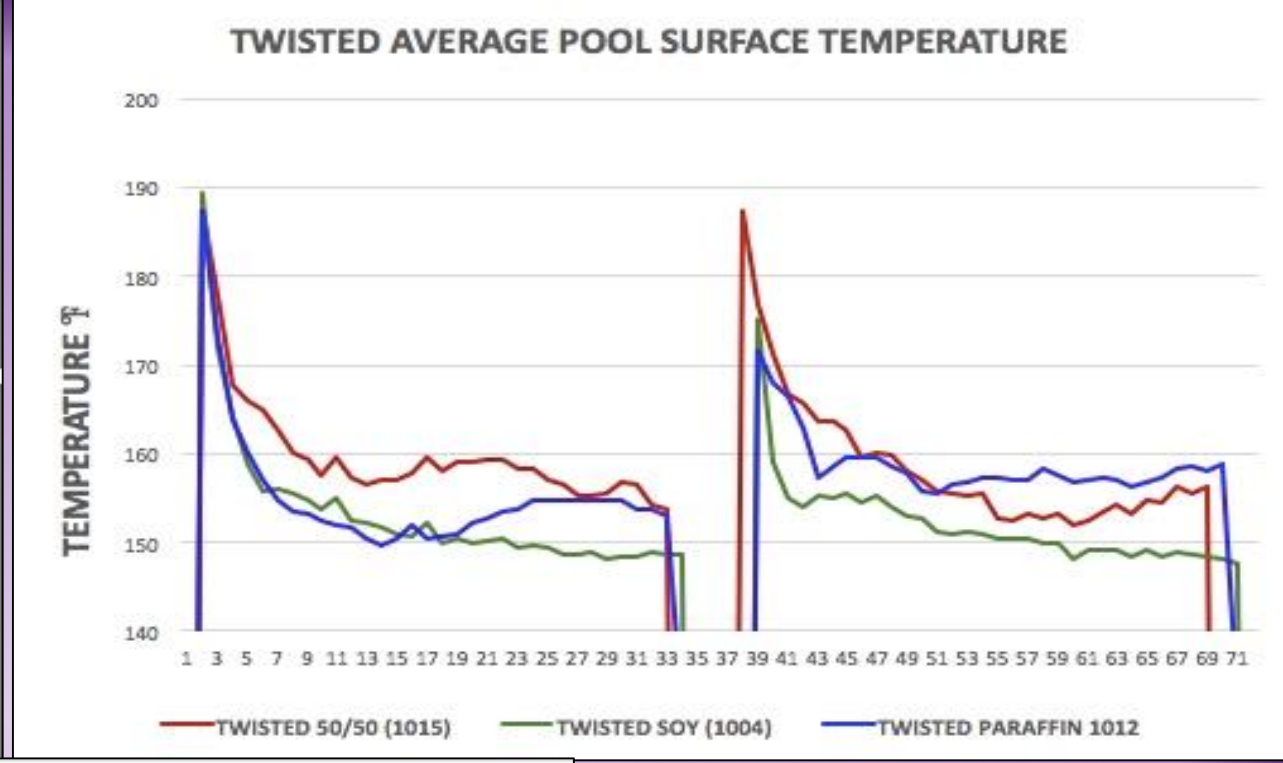


100% Paraffin: Blue
100% Soy: Green
50/50 Blend: Red

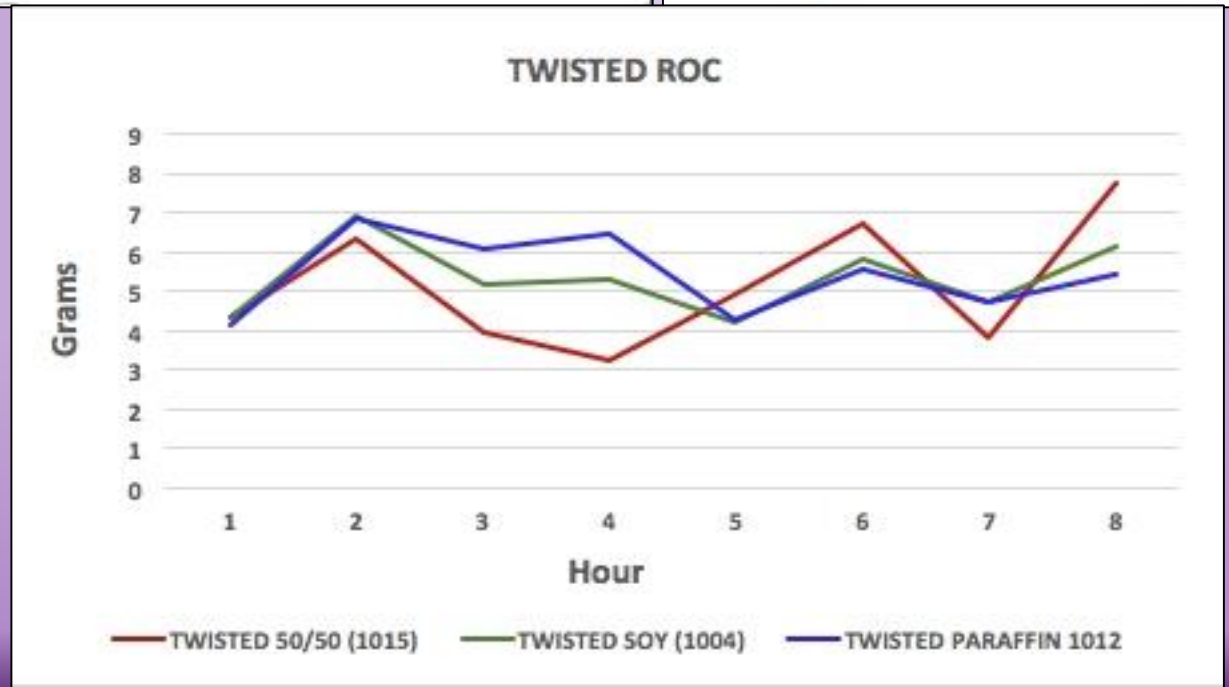


100% Paraffin: Blue
100% Soy: Green
50/50 Blend: Red





100% Paraffin: Blue
100% Soy: Green
50/50 Blend: Red



100% Paraffin: Blue
100% Soy: Green
50/50 Blend: Red

CONCLUSION

In conclusion, the same size wick would not perform the same in different waxes or blends. The heat emitted by a wick can change the way the waxes recrystallize after a burn cycle especially the first one. Also, as previously explained, the viscosity of the waxes is very important when wicking a candle because some waxes require more space between threads to be able to transport thicker or more viscous materials. Small changes during the wick manufacturing, for example tension of the threads, can make a big impact in how a wick performs. Test burning is always recommended to achieve a safe and clean burning performance.

Thank you!