A New Frying System with FryLiquid®

A program to protect the composition and enhance the cooking performance of oils

fryliquid® anti-oxidant By: MIROIL®

Barbara Bielska, Ph.D., MirOil
Bernard Friedman
Original location: Allentown, USA

Oil Management for Optimum Frying

FryLiquid® Antioxidant and MirOil Oil Management Guidelines

Frying is a widely accepted method of food preparation. When fried food is prepared with good oil, the result is tasty and healthy food.

FryLiquid® antioxidant and MirOil oil management guidelines protect oil composition and enhance frying performance.

fryliquid® anti-oxidant By: MIROIL®

What is FryLiquid® antioxidant?

What is an antioxidant?

FryLiquid® is a cocktail of natural antioxidants derived from food material that function to protect the oil at frying temperatures.

How does FryLiquid® antioxidant work?

FryLiquid® adds back antioxidants to the oil to prevent thermal degradation and oxidation reactions.
This prevents the formation and the accumulation of unhealthy breakdown substances.

fryliquid® anti-oxidant By: MIROIL®

Why is it important to use FryLiquid® Antioxidant?

- Oil producers add antioxidants to their oils.
- They do this to protect the oil while it is waiting to be put into the fryer.
- These antioxidants are not designed to function at frying temperatures so they “burn” up in a few minutes in the fryer.
- All antioxidants are consumed as they accomplish their mission (to prevent oxidation breakdown reactions). In order to provide this important effect, antioxidants must be replenished as they are lost from heat and cooking.
- FryLiquid® adds back antioxidants to the oil to prevent its thermal degradation and creation of unhealthy breakdown compounds.
- These breakdown substances are small molecules and pass through ALL filters.

fryliquid® anti-oxidant By: MIROIL®

Why is it important to use FryLiquid®?

- Many countries have laws that define a deteriorated frying fat as having unacceptably high polar content.
- Polar content is the accumulation of altered oil molecules.
- When oil molecules are altered, they become polar.
- Fresh cooking oils and fats are predominantly non-polar.
- All altered oil molecules accumulate as polar compounds.
- Studies show that "polar” content in a frying fat provides the most reliable measure of the extent of deterioration of fat in frying.

fryliquid® anti-oxidant By: MIRAIL®

FryLiquid® Benefits

1. Reduced oil absorption on/in the fried food

2. Less oil discarded

3. The ability to maintain production quotas and quality criteria while cooking at lower temperatures

4. Reduced energy consumption

5. Less FFA and especially OFA, less oxidative degeneration

6. Waste is reduced

7. Yield is improved

8. Improved sensory properties

9. Longer shelf life

10. Improved work environment

11. Faster freezing cycle

12. Cleaner fryer surfaces

13. A most important benefit: Healthier Fried Food

fryliquid® anti-oxidant By: MIRAIL®

FryLiquid® Benefits

Free Fatty Acids

Free Fatty Acids are formed by thermal hydrolysis (heat in the presence of moisture) and also by oxidation.
The FFA from thermal hydrolysis have a more benign impact on oil performance while OFA (formed by oxidation reactions) aggressively undermines cooking performance.

OFA

A most important benefit of FryLiquid® is that it helps suppress OFA formation (oxidized fatty acids).
It is found that FFA quality limits may be increased significantly without compromising food quality when there is minimal or no OFA present in the oil.

fryliquid® anti-oxidant By: MIRAIL®

Benefits: Study Example

The Raising Rate of the Temperature of the Center of Fried Meat Cake

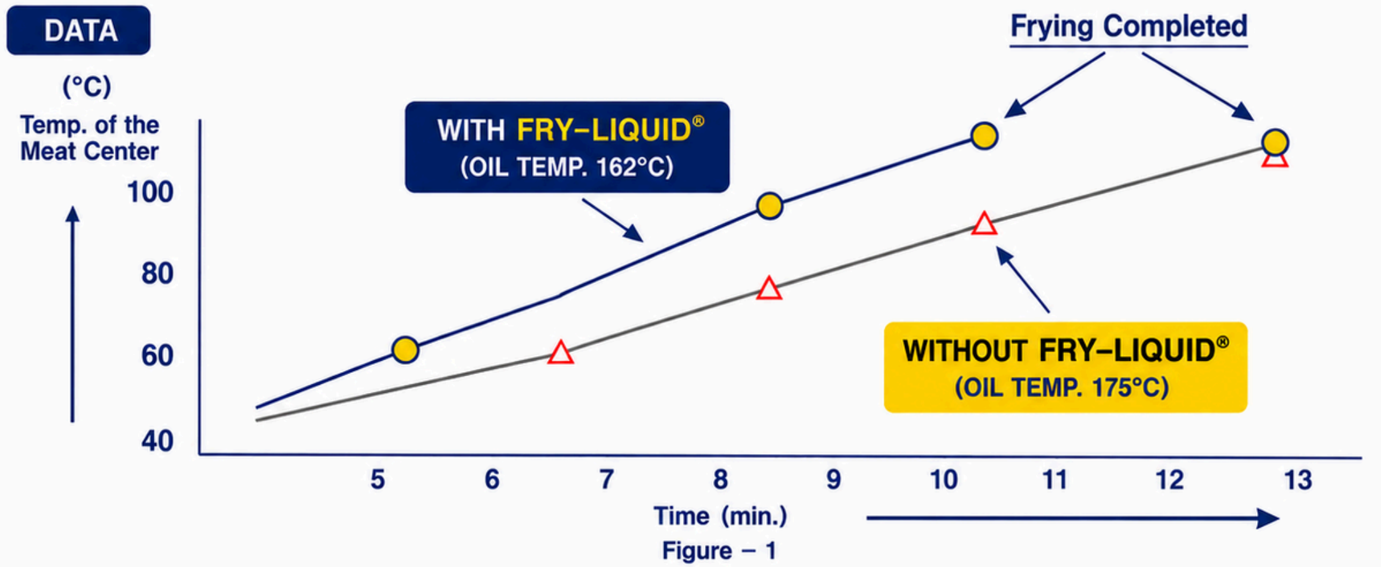


Figure – 1

PHOTO – 1 ATTACHED (FRIED MEAT CAKES IN TWO CONDITIONS)	
Fried meat cake is very light in color	WITH FRY–LIQUID® (OIL TEMP. 162°C)
Fried meat cake is dark in color	WITHOUT FRY–LIQUID® (OIL TEMP. 175°C)

fryliquid® anti-oxidant By: MIROIL®

Benefits: Study Example

Some comments of Mrs. K. Yamashita, Author

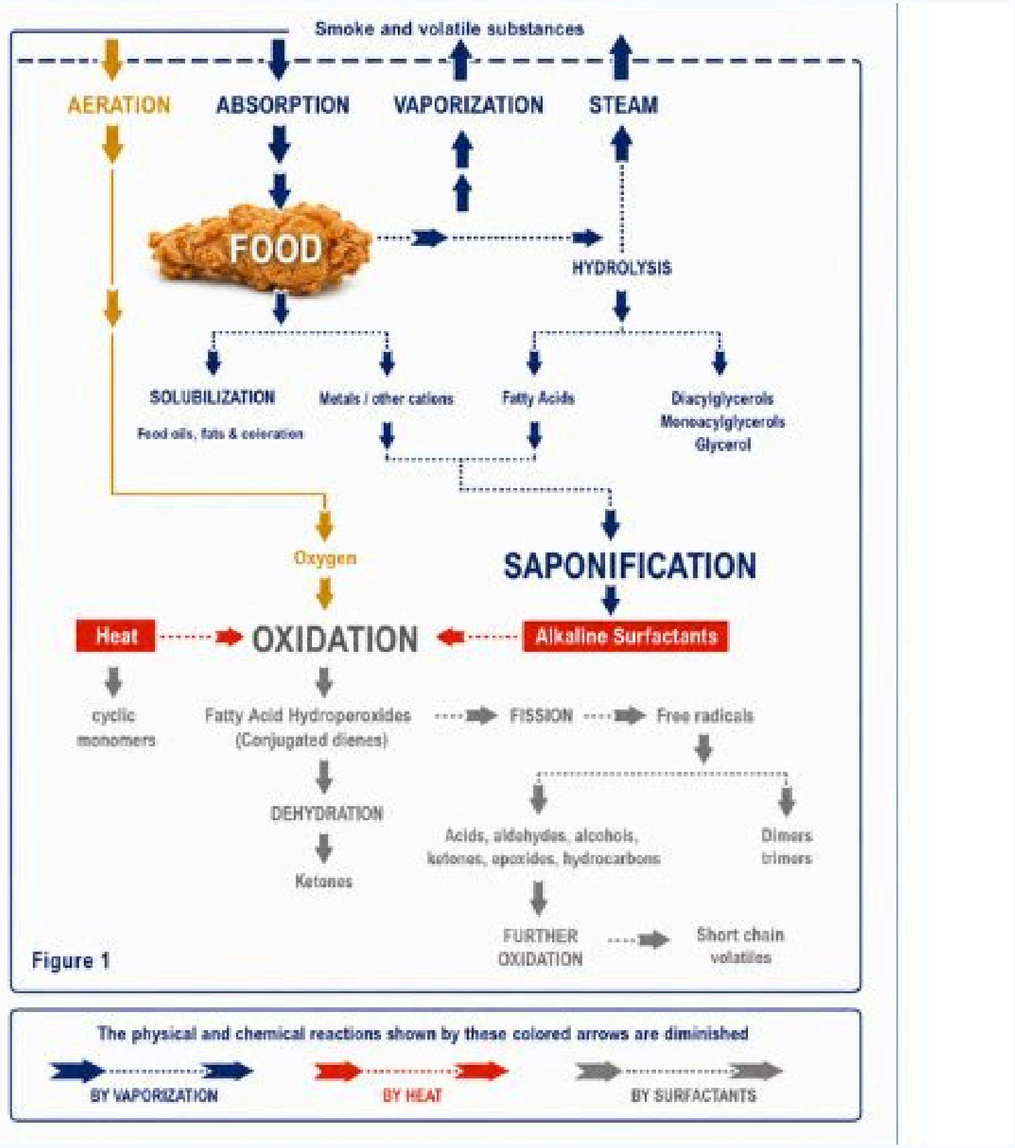
- In spite of the lower temperature of the fry oil with the liquid, fried food is fried faster.
- Breading or batter on the food surface is very light.
- All the fried foods tested looked beautiful and tasty.
- I am sure that fried food has improved so much, especially fried meat cake.
- And I feel that the frying oil with the FryLiquid® might have had big impact.

fryliquid® anti-oxidant By: MIROIL®

FryLiquid® Antioxidant Benefits

How are benefits delivered?

- The physical and chemical processes of frying are illustrated.
- The blue arrows show healthy occurrences and reactions.
- The brown arrows are reactions that form unhealthy substances.
- FryLiquid® prevents breakdown from oxidation and heat reactions.
- Among these unhealthy breakdown substances are mutagens and carcinogens.



Benefits: explanation

1. Reduced oil absorption on/in the fried food

The oil is restored to the oleophobic properties of fresher oil.
There is a noticeable lessening in oil pickup, even with the short dwell times accompanying par-frying.
An unexpected effect in most operations is that the weight doesn't change. The less oil pick up is balanced by less migration of water from food surfaces.

2. Less oil discarded

With high daily turnover from production, fryers are usually operated without discard. Where periodic discard is usual, the frequency will be increased.
If daily oil turnover (in 2 shifts) is more than 50%, zero discard is probable.
With oil management for Optimum Frying the oil composition never builds to a peak of the level of deterioration where it is discarded.
A portion of oil may be discarded to keep the oil always good. This gives an equivalent life of oil that is always more than it was before the FryLiquid® program

fryliquid® anti-oxidant By: MIROIL®

Benefits cont.

3. The ability to maintain production quotas and quality criteria while cooking at lower temperatures

All oils benefit from lower cooking temperatures. This is especially true for oils produced with zero trans fatty acids. The program allows frying at temperatures 20°F to 50°F lower.
It is an unexpected and important benefit that there is enhanced heat delivery to food centers with these lower temperatures.

4. Reduced energy consumption

a. From cooking at lower temperatures
b. A greater source of energy reduction is that there is less migration of water from the food. More water retention = less water that is converted to steam. More water retention = less shrinkage of the food.

fryliquid® anti-oxidant By: MIROIL®

Benefits cont.

5. Less FFA and especially less OFA

The oxidative degeneration of fats is a complex process leading to varied decomposition products, notably organic peroxides, alcohols, aldehydes, ketones, carboxylic acids, and other toxic materials.
The oxidation process begins with the contact of air with hot oil and the ultimate creation of oxidized fatty acids (OFA). Continued heating transforms the OFA into secondary and tertiary by-products.
These by-products cause many of the off-flavors and off-odors in oil and fried food.
Oxidation rate decreases with the decrease of the temperature and cooking time.
FryLiquid® suppresses the formation of both FFA and OFA, peroxide and other polar substances formed by oxidation reactions.
Our experience is that OFA usually accounts for 25% to 30% of the FFA value.

fryliquid® anti-oxidant By: MIROIL®

Benefits cont.

6. Waste is reduced

Sticking and/or agglomeration of food is inhibited

7. Yield is improved

Shedding of breading and/or batter during frying and freezing is diminished

8. Improved sensory properties

Dark edges and blisters on chips are avoided
The finish is like cooking in fresher oil

9. Longer shelf life

The improved oil composition contributes to slowing the onset of rancidity

fryliquid® anti-oxidant By: MIROIL®

Benefits cont.

10. Improved work environment

Avoid “fried oil smell” and volatile eye irritants

11. Faster freezing cycle

Will vary with product - Often 8% faster is reported

12. Cleaner fryer surfaces

Preventing the formation of polymers and other oxidation products reduces the scope of fryer cleaning and maintenance

The listed benefits have been observed with a broad range of food products in factory trials. Individual results may vary with food, oils and oil management procedures.

fryliquid® anti-oxidant By: MIRAIL®

Benefits cont.

13. Healthier Fried Food
A. Less fat in the food

Lower fat absorption allows consumers to enjoy food with less calories and fewer unhealthy oil breakdown substances

B. Lower amount of oxidized fatty acids and oxidative degradation products

FryLiquid® inhibits oxidative degradation of fatty acids resulting in significantly lower amounts of harmful products.

fryliquid® anti-oxidant By: MIROIL®

Benefits cont.

13. Healthier Fried Food
C. Less acrylamide

FryLiquid® inhibits formation of acrylamide and acrolein. Lower cooking temperature and shorter cooking time also minimize acrylamide formation,

D. Ability to cook with zero-trans-fat oils

Most oils with zero trans fatty acids are more vulnerable to thermal degradation. FryLiquid® has been used successfully at frying temperatures 20°F to 50°F lower, depending on the fryer, oil, and food.

fryliquid® anti-oxidant By: MIRAIL®

Oil Management for Optimum Frying

Typical Start-Up Experiences

Start up report with a poultry producer

- Oil temperature dropped from 390°F to 340°F.
- Oil discard from high FFA was no longer required.
- Overall oil consumption reported to be reduced 25%.
- Quality of chicken was consistent with higher center temperatures.
- Energy savings were significant, but not reported.

fryliquid® anti-oxidant By: MIROIL®

Oil Management for Optimum Frying

Summary of Benefits

- Consistent and enhanced oil composition with less polar content
- Lower FFA values (usually) and minimal or zero OFA
- Reduced oil consumption from less absorption and less discard of oil
- More food succulence (more retained food fluids)
- Improved yield (more retained breading and fluids)
- Reduced energy consumption during frying
- Reduced gum and carbon deposits
- Improved shelf life
- **Cost savings**
- **Healthier food**

fryliquid® anti-oxidant By: MIRAOIL®