ACS Webinars
CLICK • WATCH • LEARN • DISCUSS

ACS Chemistry for Life®

Have Questions?

Type them into questions box!

"Why am I muted?"
Don't worry. Everyone is muted except the presenter and host. Thank you and enjoy the show.

ACS Webinars
CLICK • WATCH • LEARN • DISCUSS

@AmerChemSociety

@AmericanChemicalSociety

@AmerChemSociety

LinkedIn https://www.linkedin.com/company/american-chemical-society

Check out the ACS Webinar Library!

An ACS member exclusive benefit

ACS Chemistry for Life®

Hundreds of presentations from the best and brightest minds that chemistry has to offer are available to you on-demand. The Library is divided into 6 different sections to help you more easily find what you are searching.

Professional Development

▶ View the Collection

Learn how to write better abstracts, deliver more engaging presentations, and network to your next dream job. Brush up on your soft skills and set a new career path by mastering what can not be taught in the lab.

Technology & Innovation

▶ View the Collection

From renewable fuels to creating the materials for the technology of tomorrow, chemistry plays a pivotal role in advancing our world. Meet the chemists that are building a better world and see how their science is making it happen.

Drug Design and Delivery

▶ View the Collection

The Drug Design Delivery Series has built a collection of the top minds in the field to explain the mechanics of drug discovery. Discover the latest research, receive an overview on different fields of study, and gain insight on how to possibily overcome your own med chem roadblocks.

Culinary Chemistry

▶ View the Collection

Why does food taste better when it is grilled or what molecular compounds make a great wine? Discover the delectable science of your favorite food and drink and don't forget to come back for a second helping.

Popular Chemistry

▶ View the Collection

Feeling burdened by all that molecular weight? Listen to experts expound on the amazing side of current hot science topics. Discover the chemistry of rockets, how viruses have affected human history, or the molecular breakdown of a hangover.

Business & Entrepreneurship

▶ View the Collection

How do ideas make it from the lab to the real world? Discover the ins and outs of the chemical industry whether you are looking to start a business or desire a priceless industry-wide perspective.

https://www.acs.org/content/acs/en/acs-webinars/videos.html

3

Learn from the best and brightest minds in chemistry! Hundreds of webinars on diverse topics presented by experts in the chemical sciences and enterprise.

Edited Recordings are an exclusive ACS member benefit and are made available once the recording has been edited and posted.

Live Broadcasts of ACS Webinars® continue to be available to the general public several times a week generally from 2-3pm ET!

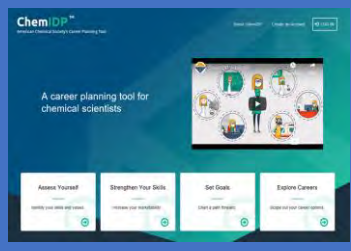
A **collection of the best recordings** from the ACS Webinars Library will occasionally be rebroadcast to highlight the value of the content.

www.acs.org/acswebinars

4

Advance
YOUR CAREER

ChemIDP™



ChemIDP.org

Discover
ACS PUBLICATIONS

Publishing Resources

ACS REVIEWER LAB™

ACS axial

ACS AUTHOR UNIVERSITY

ACS Authoring Services

publish.acs.org

Connect
WITH CHEMISTS AND OTHER SCIENCE PROFESSIONALS

CAS SciFinder Future Leaders

171 alumni, 35 countries and over 120 institutions

acsoncampus.acs.org/resources

ACS Chemistry for Life®

CAS A DIVISION OF THE AMERICAN CHEMICAL SOCIETY

ACS Publications Most Trusted. Most Cited. Most Read.

ACS ON CAMPUS

From ACS Industry Member Programs

- **Industry Matters Newsletter**

  ACS Member-only weekly newsletter with exclusive interviews with industry leaders and insights to advance your career.

  Preview & Subscribe: acs.org/indnews

- in ACS Innovation Hub

  Connect, collaborate, and stay informed about the trends leading chemical innovation

  Join: bit.ly/ACSinnovationhub

ACS Career Navigator: Your Home for Career Services

Whether you are just starting your journey, transitioning jobs, or looking to brush up or learn new skills, the **ACS Career Navigator** has the resources to point you in the right direction.

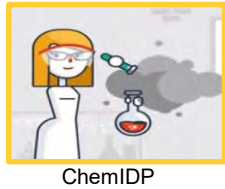
We have a collection of career resources to support you during this global pandemic:

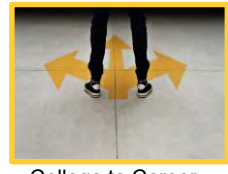

Professional Education


Virtual Career Consultants

ACS Leadership Development System


Career Navigator LIVE!


ChemIDP


College to Career

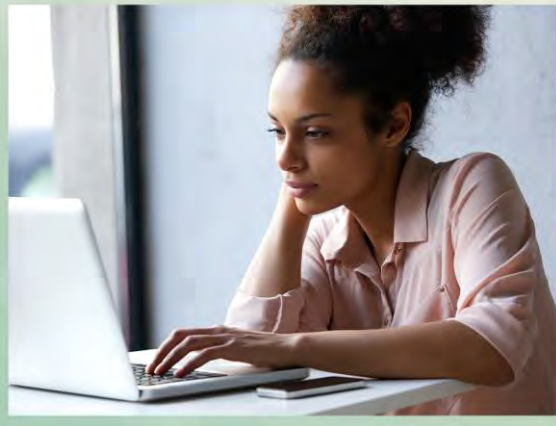
ACS Webinars

Virtual Classrooms

Visit www.ACS.org/COVID19-Network to learn more!

7

Join us in our efforts to increase the diversity of chemistry.



Valued donors like you have sustained ACS educational programs that are welcoming students from diverse backgrounds into our profession.

www.acs.org/donate

ACS Office of Philanthropy
Chemistry for Life®

8

ACS Department of Diversity Programs

Advancing ACS's Core Value of Diversity, Inclusion & Respect

We believe in the strength of diversity in all its forms, because inclusion of and respect for diverse people, experiences, and ideas lead to superior solutions to world challenges and advances chemistry as a global, multidisciplinary science.

Contact Us:
https://app.suggestionox.com/r/DI_R
Diversity@acs.org

@ACSDiversity

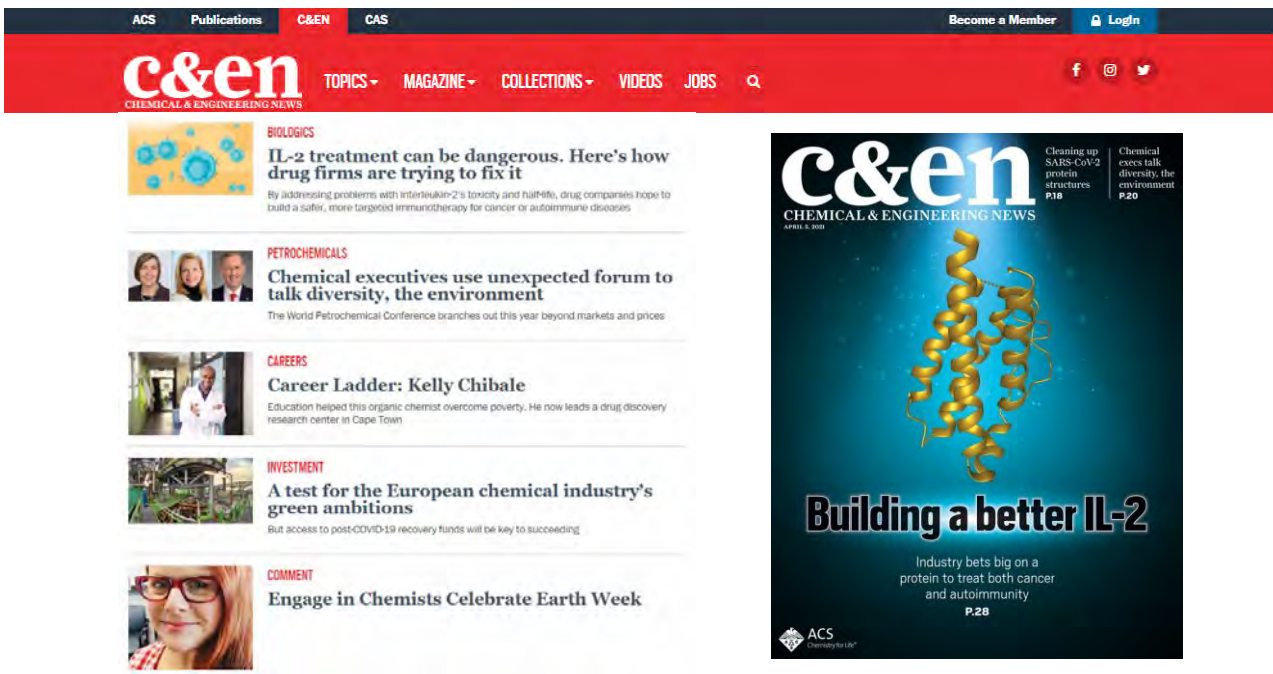
ACS Diversity

ACS Voices Diversity Podcast

acsvoices.podbean.com/

www.acs.org/diversity

9



https://cen.acs.org

10

ACS Webinars
CLICK • WATCH • LEARN • DISCUSS

ACS Chemistry for Life®

Date: Thursday, April 8, 2021 @ 1-2pm ET
Speaker: Robert Fry, Robert Fry Economics LLC
Moderator: Keith Wing, Keith Wing Consulting

Register for Free!

What You Will Learn:

- The future of domestic manufacturing and chemical industry
- The speed and timing of the recovery of the 2020 recession
- The long-term implications of the COVID-19 pandemic and the policy response to it

Co-produced with: The Science History Institute and *Chemical & Engineering News*

Date: Wednesday, April 14, 2021 @ 2-3:30pm ET
Speakers: Timothy Long, Arizona State University and Amy Peterson, The University of Massachusetts Lowell
Moderator: Bryan Vogt, Penn State University

Register for Free!

What You Will Learn:

- Fundamental understanding of the five platforms for additive manufacturing of polymers
- Awareness of the synergy of designing polymer reactivity with tailored functionality, required process viscosity that aligns with various printing platforms, and the opportunities for resolution and geometric control of printed objects
- Appreciation for current trends in the literature for additive manufacturing of polymers and the design of polymer structure for rapidly emerging printing platforms

Co-produced with: *ACS Applied Polymer Materials* and the ACS Division of Polymer Chemistry

Date: Thursday, April 15, 2021 @ 2-3pm ET
Speaker: Jordan Harshman, Auburn University and Anne Kondo, Indiana University Pennsylvania
Moderator: Marian Gindy, Merck

Register for Free!

What You Will Learn:

- What collaborative work involves
- What team skills employers expect
- How professional skills are acquired

Co-produced with: ACS Education

11

www.acs.org/acswebinars

FREE Webinar | TODAY at 2pm ET

ACS Webinars
CLICK • WATCH • LEARN • DISCUSS

THIS ACS WEBINAR WILL BEGIN SHORTLY . . .

12

ACS Webinars
CLICK • WATCH • LEARN • DISCUSS

ACS Chemistry for Life®

Food Fraud: Combating Adulteration in Olive and Avocado Oils

Selina Wang
Faculty, Department of Food Science and Technology, University of California, Davis

Britt Erickson
Senior Editor,
Chemical & Engineering News

Presentation slides are available now! The edited recording will be made available as soon as possible.

www.acs.org/acswebinars

This ACS Webinar is co-produced with Chemical & Engineering News.

13

13

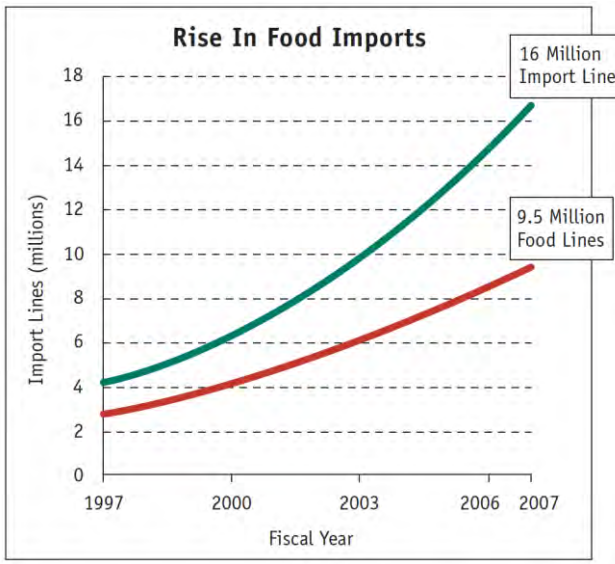
Food Fraud: Combating Adulteration in Olive and Avocado Oils

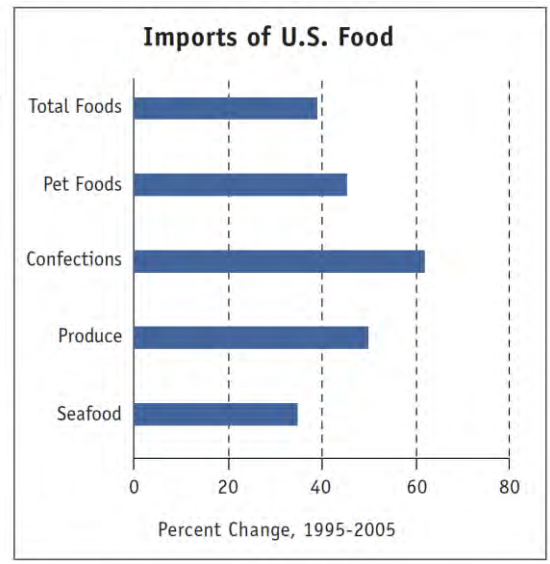
SELINA WANG

April 7th, 2021

UCDAVIS
COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES

14



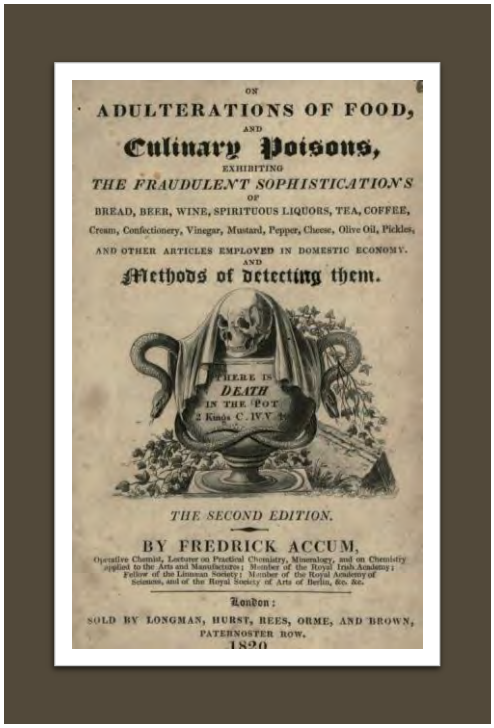


Source: Food Protection Plan FDA

15

Food fraud is an old and modern problem

16


ON
ADULTERATIONS OF FOOD,
AND
Culinary Poisons,
EXHIBITING
THE FRAUDULENT SOPHISTICATIONS
OF
BREAD, BEER, WINE, SPIRITUOUS LIQUORS, TEA, COFFEE,
Cream, Confectionery, Vinegar, Mustard, Pepper, Cheese, Olive Oil, Pickles,
AND OTHER ARTICLES EMPLOYED IN DOMESTIC ECONOMY.
AND
Methods of detecting them.
THERE IS
DEATH
IN THE POT
2 Kings C. IV. V. 40
THE SECOND EDITION.
BY FREDRICK ACCUM,
Operative Chemist, Lecturer on Practical Chemistry, Mineralogy, and on Chemistry
applied to the Arts and Manufactures; Member of the Royal Irish Academy;
Fellow of the Linnean Society; Member of the Royal Academy of
Sciences, and of the Royal Society of Arts of Berlin, &c. &c.
London:
SOLD BY LONGMAN, HURST, REES, ORME, AND BROWN,
PATERNOSTER ROW.
1820

"The man who robs a fellow subject of a few shillings on the high-way, is sentenced to death; while he who distributes a slow poison to a whole community, escapes punishment."

Fredrick Accum

A Treatise on Adulterations of Food and Culinary Poisons

(1820)

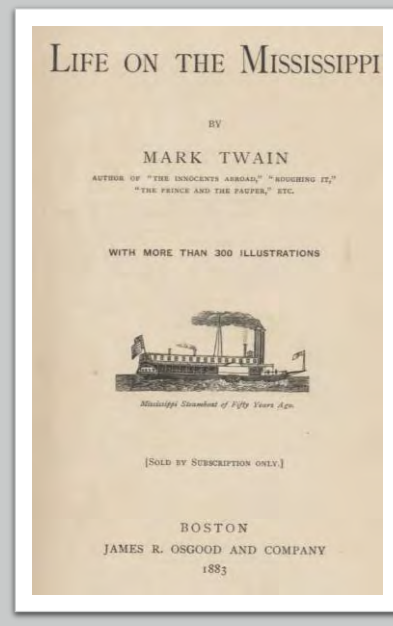
17

"They make olive-oil out of cottonseed-oil, now a days, so that you can't tell them apart."

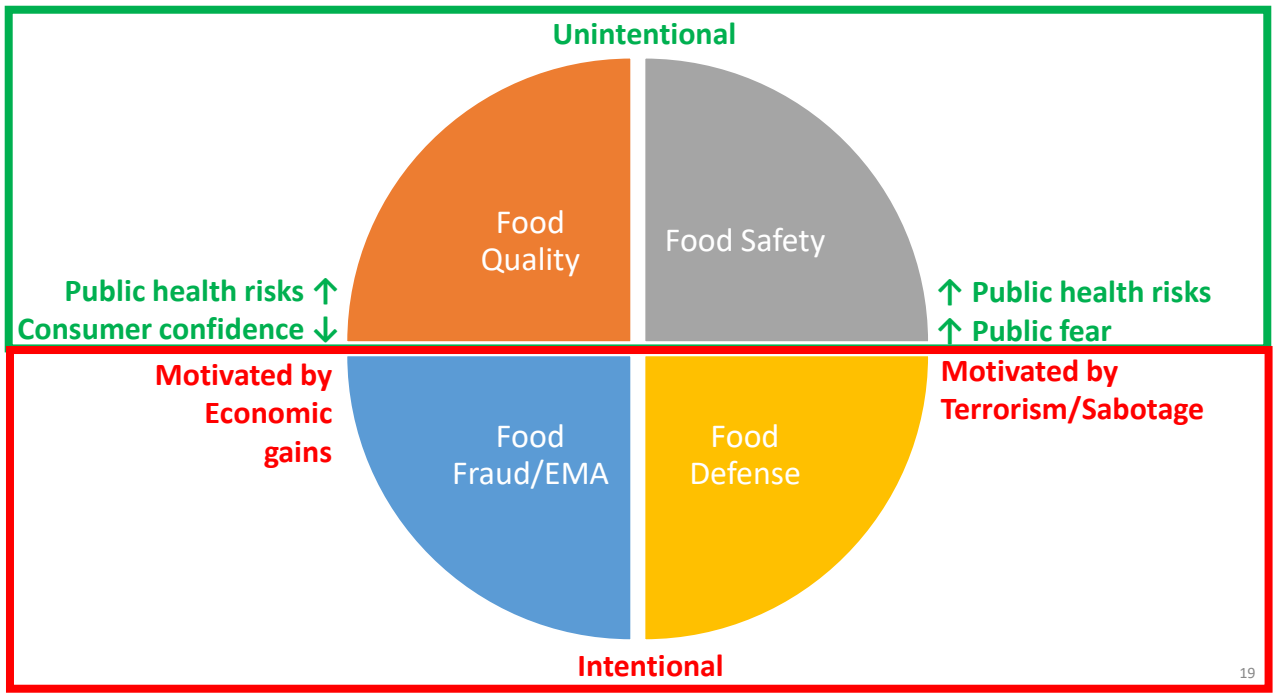
Mark Twain

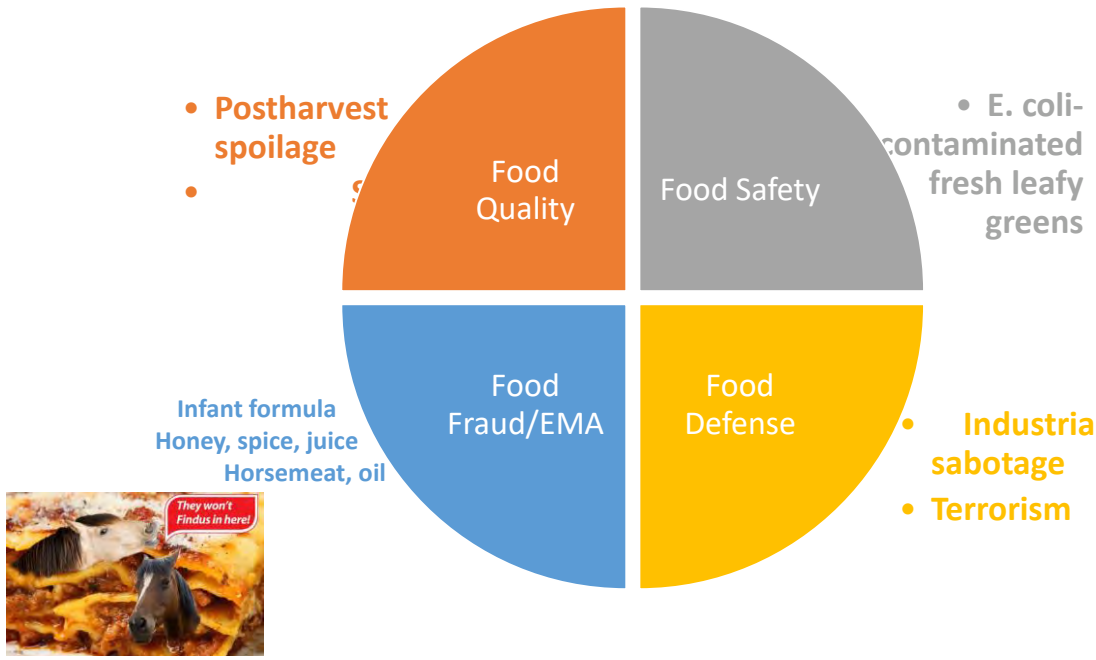
Life on the Mississippi

(1883)

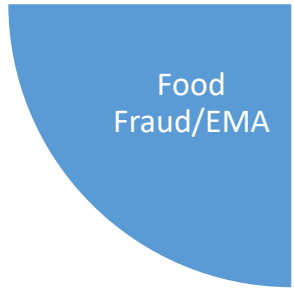

LIFE ON THE MISSISSIPPI
BY
MARK TWAIN
AUTHOR OF "THE INNOCENTS ABROAD," "ROUGHING IT,"
"THE PRINCE AND THE PAUPER," ETC.
WITH MORE THAN 300 ILLUSTRATIONS
Mississippi Steamboat of Fifty Years Ago.
[SOLD BY SUBSCRIPTION ONLY.]
BOSTON
JAMES R. OSGOOD AND COMPANY
1883

18


Unintentional
Food Quality
Food Safety
Public health risks ↑
Consumer confidence ↓
↑ Public health risks
↑ Public fear
Motivated by Economic gains
Motivated by Terrorism/Sabotage
Food Fraud/EMA
Food Defense
Intentional
19

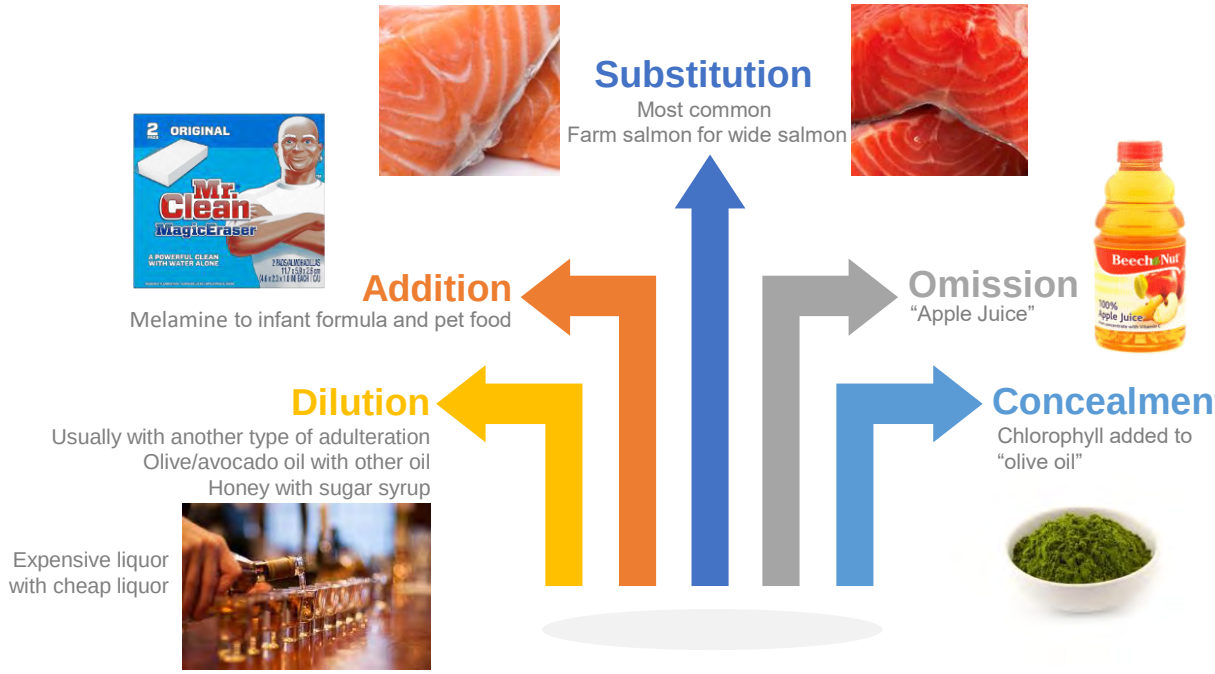

• Postharvest spoilage
•
• E. coli-contaminated fresh leafy greens
Food Quality
Food Safety
Food Fraud/EMA
Food Defense
Infant formula
Honey, spice, juice
Horsemeat, oil
• Industrial sabotage
• Terrorism
They won't Findus in here!
20

There is no statutory definition of food fraud or "economically motivated adulteration" or EMA of foods or food ingredients, which is generally considered a subset of food fraud.

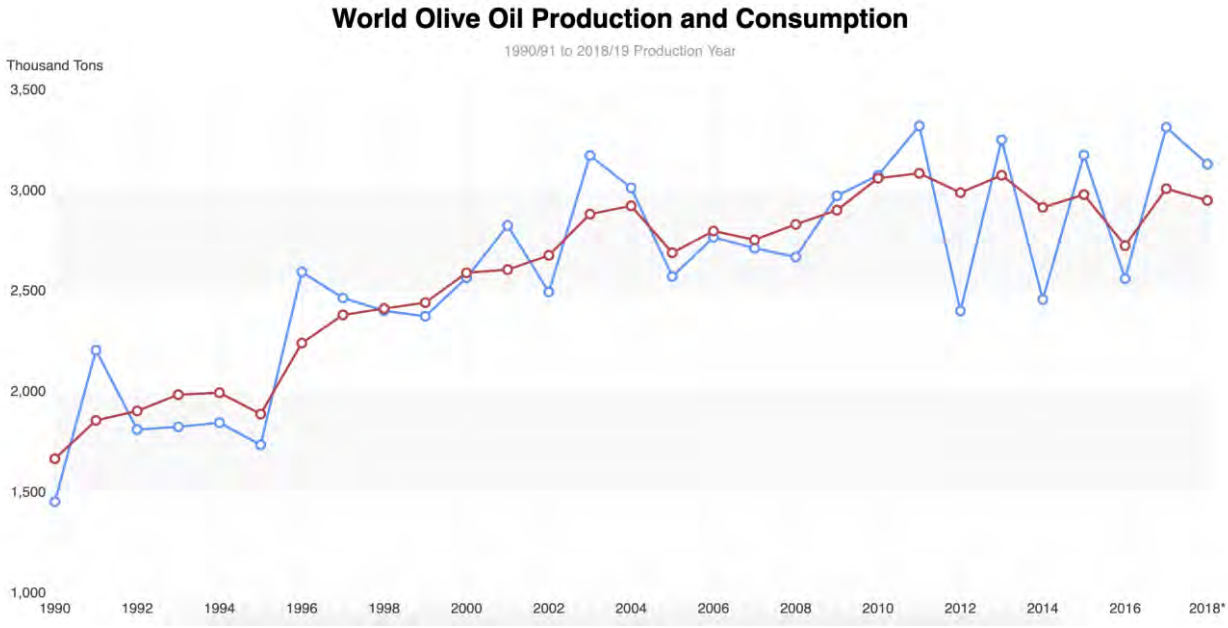


In 2009, FDA 's EMA Working Group had defined EMA as the "fraudulent, intentional substitution or addition of a substance in a product for the purpose of increasing the apparent value of the product or reducing the cost of its production, i.e., for economic gain…."

21

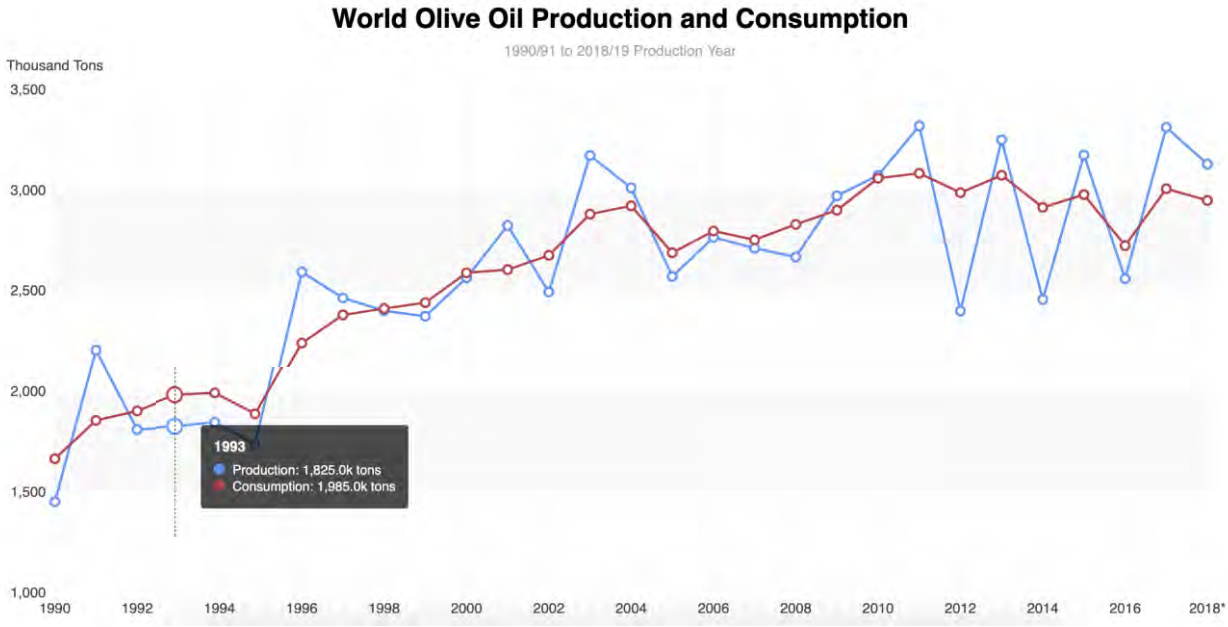


22



Source: Olive Oil Times

23



Source: Olive Oil Times

24

Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT

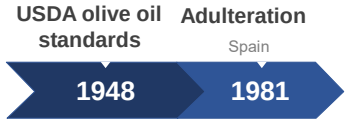
What the % of olive oil consumed in the U.S. is domestically produced?

- 1 Percent
- 5 Percent
- 25 Percent
- 50 Percent

25

USDA olive oil standards

1948



UCDAVIS COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES

27

Toxic Oil Syndrome (TOS)

28


Cooking Oil Scandal Hurts Spain Abroad

October 19, 1981, Section A, Page 3

- A scandal involving the illicit sale of toxic cooking oil, which has taken at least 160 lives and spread panic among Spanish consumers, has begun to concern nations that import Spanish canned goods and vegetable oils.

- A week ago, the European Parliament in Strasbourg, France, voted in favor of a system that would permit the rapid withdrawal of contaminated products sold in the Common Market in light of the Spanish situation, which has affected some 15,000 people who consumed rapeseed oil that had been intended for industrial use.

- As a precautionary measure, Italy earlier this month temporarily blocked imports of Spanish olive oil and canned goods such as fish that contain oil until health authorities had determined the toxic agent that has produced the fatalities. The French Government is expected to follow the Italian example by banning the import of similar products for three months beginning tomorrow.

29

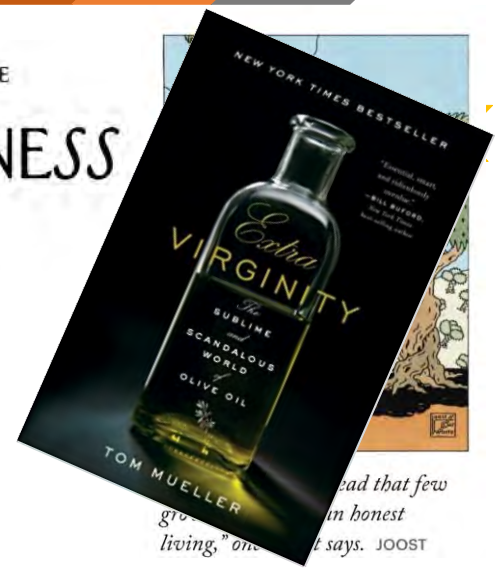
USDA olive oil standards	Adulteration Spain	Adulteration Turkey, Italy	Adulteration USA	Adulteration Canada	The New Yorker
1948	1981	1991	1993	1997	2007

LETTER FROM ITALY AUGUST 13, 2007 ISSUE

SLIPPERY BUSINESS

The trade in adulterated olive oil.

By Tom Mueller
August 6, 2007



ead that few
n honest
living," on *t says.* JOOST

31

USDA olive oil standards	Adulteration Spain	Adulteration Turkey, Italy	Adulteration USA	Adulteration Canada	The New Yorker	Adulteration Italy, Spain
1948	1981	1991	1993	1997	2007	2008

33

Specific findings of our tests include (see Table 3 for summary of results):

- 69 percent of imported olive oil samples and 10 percent of California olive oil samples labeled as extra virgin olive oil failed to meet the IOC/USDA sensory (organoleptic) standards for extra virgin olive oil. The Australian sensory panel found that each of these samples scored a median of up to 3.5 sensory defects such as rancid, fusty, and musty and were classified at the lower grade of "virgin." Sensory defects are indicators that these samples are oxidized, of poor quality, and/or adulterated with cheaper refined oils.

- 31 percent of the imported samples that failed the sensory standards also failed the IOC/USDA standards for UV absorbance of oxidation products (K232 and K268), which indicates that these samples were oxidized and/or were of poor quality.

- 83 percent of the imported samples that failed the IOC/USDA sensory standards also failed the German/Australian DAGs standard. Two additional imported samples that met the IOC/USDA sensory standard for extra virgin failed the DAGs standard.

34

Forbes

It's Extra Virgin Olive Oil Day - Is Your EVOO Real Or Fake?

TIME

MARKETING & ADVERTISING

Forget the IRS — There's an Olive-Oil Scandal Afoot

Credibility problems? Check. Overreach? Check. Finger-pointing? You betcha

By Joanne Chen May 17, 2013

35

United States Department of Agriculture

Agricultural Marketing Service

Fruit and Vegetable Programs

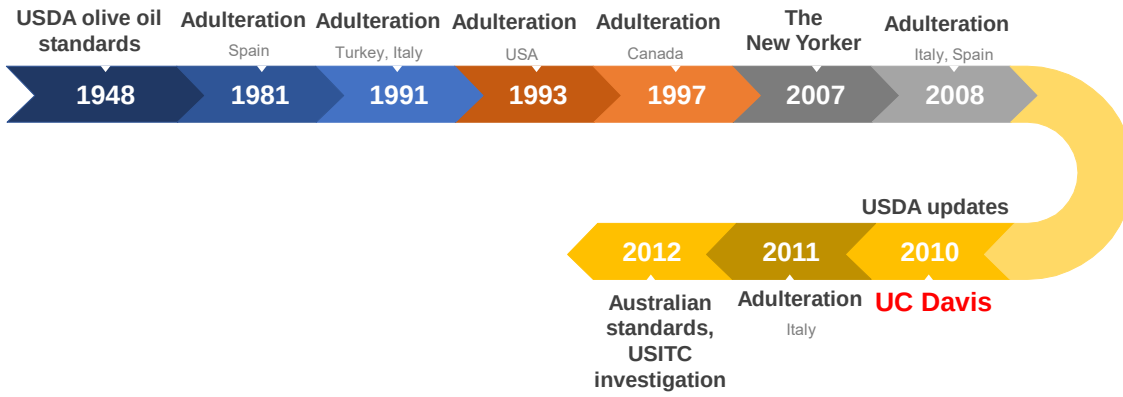
Processed Products Branch

United States Standards for Grades of Olive Oil and Olive-Pomace Oil

Effective October 25, 2010

This is the second issue of the United States Standards for Grades of Olive Oil published in the **FEDERAL REGISTER** on April 28, 2010 (75 FR 22363) to become effective October 25, 2010. This issue supersedes the first issue, which has been in effect since March 22, 1948.

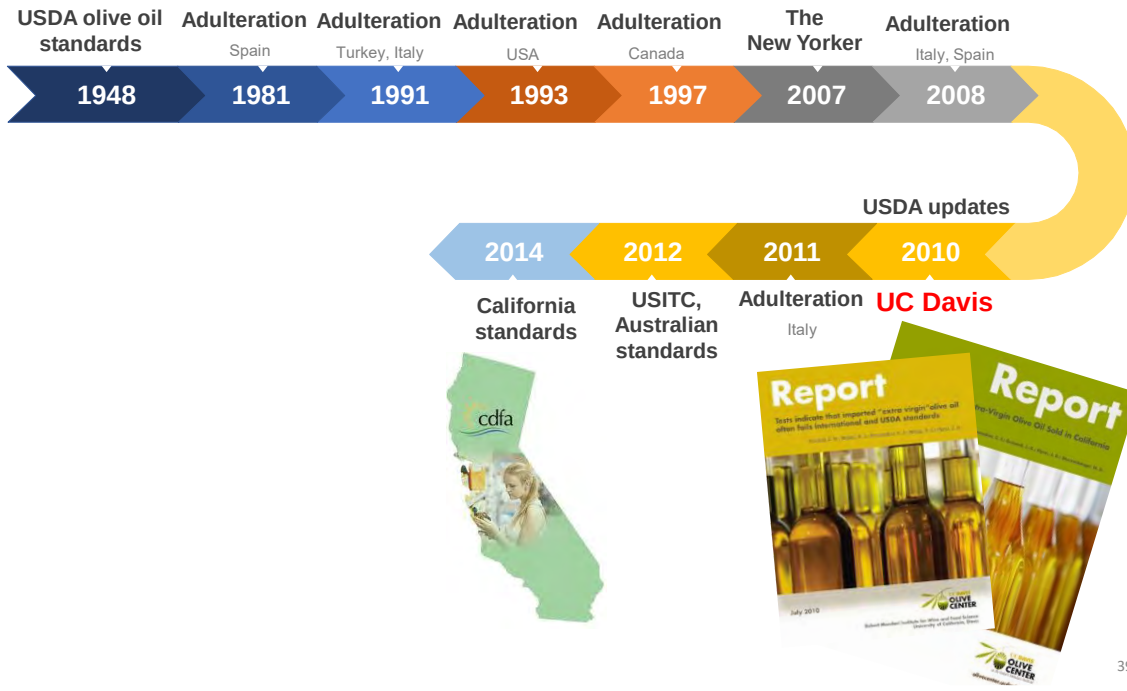
36



U.S. House Ways and Means Committee Chairman Dave Camp

"Unenforced standards lead to mislabeled products, weakening the competitiveness of quality producers"

- USITC Report



39

Quality: Extra virgin failure rates

Test	Standard	Failed
Sensory	defects = 0 and fruity > 0	54.2%
Free Fatty Acid	USDA ≤ 0.8	0.0%
Peroxide Value	USDA ≤ 20	0.7%
UV K232	USDA ≤ 2.50	8.8%
UV K268	USDA ≤ 0.22	11.2%
UV ΔK	USDA ≤ 0.01	1.5%
DAGs	AUSTRALIA ≥ 35	25.7%
PPP	AUSTRALIA ≤ 17	26.1%

Source: UC Davis Olive Center, based on 260 domestic and imported samples of "EVOO"

40

Relationship of sensory and chemistry

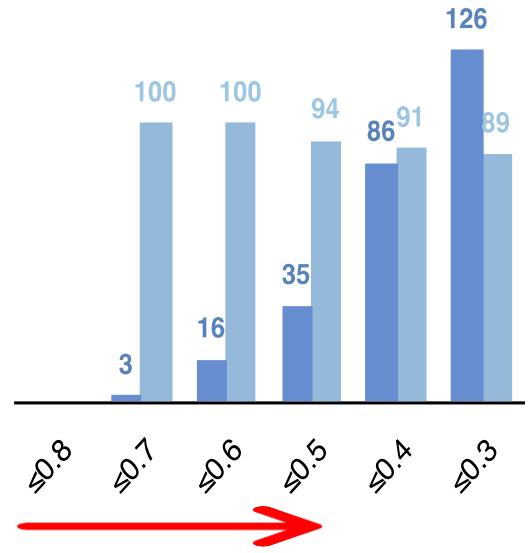
260 samples

141 failed sensory

failing chemistry standard

% also failing sensory standard

Chart 1. Free fatty acidity (FFA)



41

Relationship of sensory and chemistry

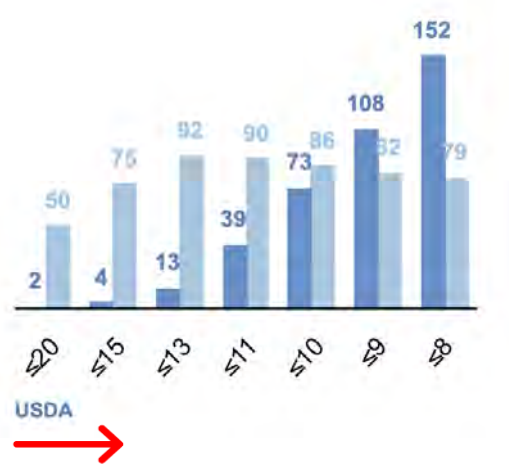
260 samples

141 failed sensory

failing chemistry standard

% also failing sensory standard

Chart 2. Peroxide value (PV)



42

Fatty Acid Profiles

Varietal	Location	Palmitic Acid (C16:0) 7.5-20.0	Oleic Acid (C18:1) 55.0-83.0	Linoleic Acid (C18:2) 3.5-21.0	Linolenic Acid (C18:3) ≤1.5
Arbequina	Central Valley	17.7±1.0	64.6±1.8	13.2±1.1	0.6±0.2
	Dry, hot dessert	**22.4±1.1**	**44.2±6.6**	**25.5±4.6**	1.1±0.1
	Outside CA	18.1±5.2	62.5±12.2	13.5±5.5	0.8±0.1
Arbosana	Central Valley	17.1±2.0	70.6±6.2	8.2±2.7	0.6±0.4
	Dry, hot dessert	**21.0±0.9**	**50.9±4.7**	**20.5±3.5**	**1.2±0.5**
Koroneiki	Central Valley	13.8±1.7	75.5±3.4	6.2±1.3	0.7±0.2
	Dry, hot dessert	17.3±0.4	65.3±2.3	11.8±2.3	0.9±0.5
	Outside CA	14.2±3.5	74.6±5.9	6.3±2.1	1.0±0.0

Sterol Profiles

Varietal	Location	Campesterol ≤4.5	Apparent B-sitosterol ≥93.0
Arbequina	Central Valley	3.5±0.3	94.0±0.5
	Dry, hot dessert	**5.3±0.3**	**92.3±0.5**
	Outside CA	3.6±0.2	94.0±0.3
Arbosana	Central Valley	3.7±0.1	94.1±0.4
	Dry, hot dessert	**4.5±0.6**	**92.7±0.9**
Koroneiki	Central Valley	4.4±0.3	93.5±0.4
	Dry, hot dessert	**4.6±0.5**	**92.5±0.9**
	Outside CA	4.4±1.0	93.3±1.1

The Effects of Variety, Growing Region, and Drought Stress on Fatty Acid and Sterol Compositions of California Olive Oil

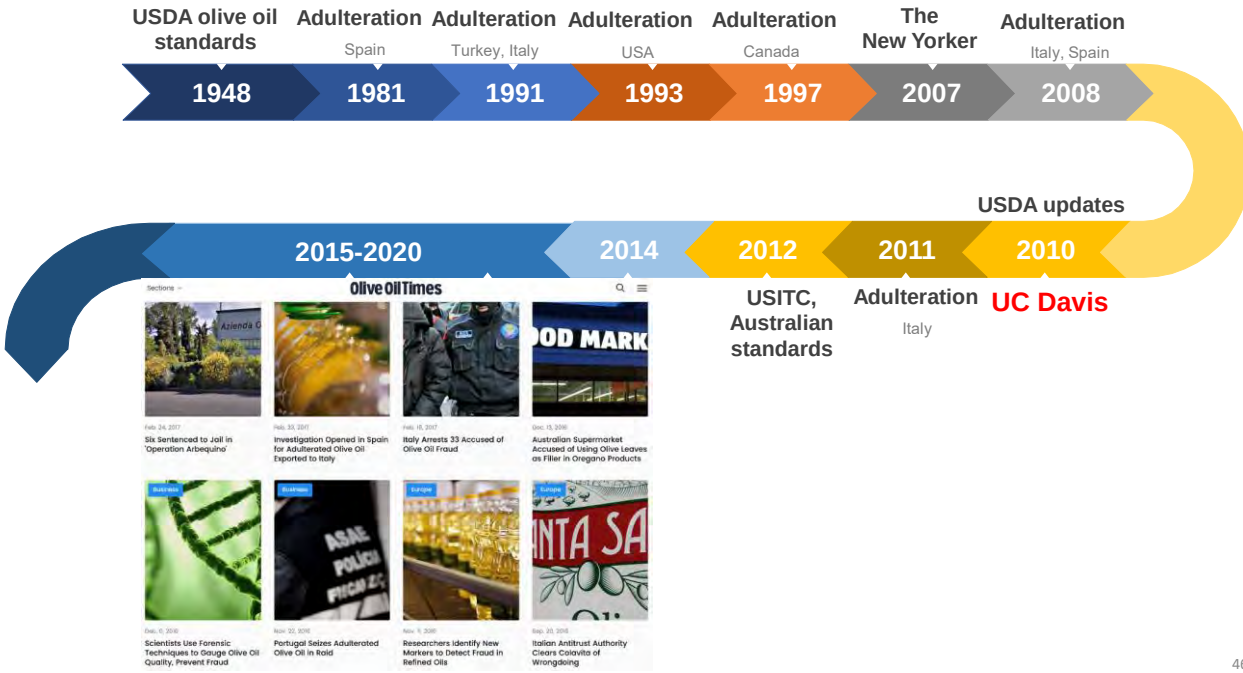
Xueqi Li[1] · Jon D. Flynn[1] · Selina C. Wang[1,2]

J Am Oil Chem Soc (2019) 96: 215–230
DOI 10.1002/aocs.12192

ORIGINAL ARTICLE

About 20% of CA authentic oil do not meet the standards.

45



46

Forbes

Feb 10, 2016, 02:24pm EST

The Olive Oil Scam: If 80% Is Fake, Why Do You Keep Buying It?

Cecilia Rodriguez Senior Contributor ⓘ ⊕
Arts

47

About Olive Oil
North American Olive Oil Association

The biggest fraud in olive oil

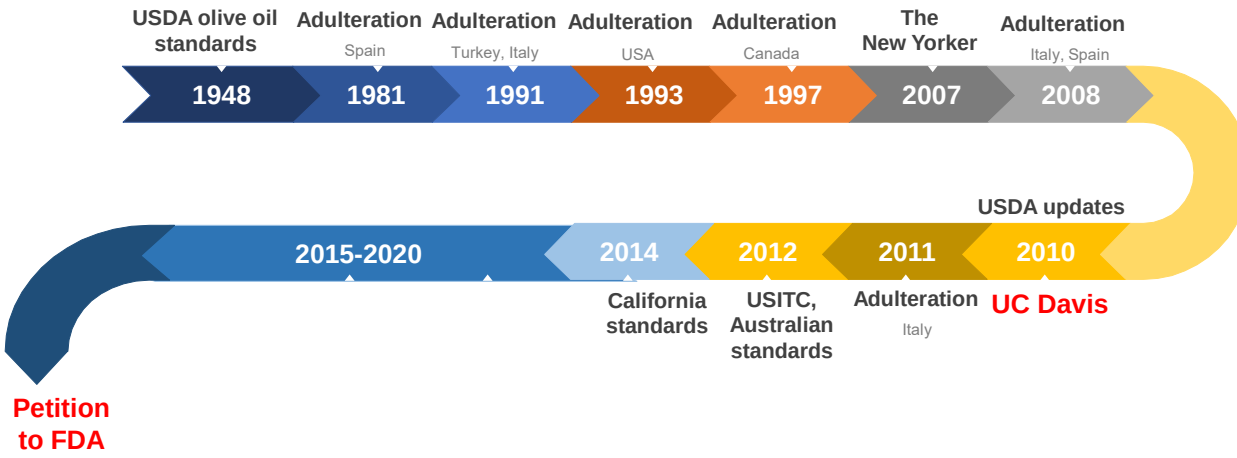
January 3, 2020

False stories frightening consumers come from untrustworthy sources

Nearly all of the "fake news" about "fake" olive oil originated from one flawed report from a biased source published years ago.

In 2010, the UC Davis Olive Center, an organization created to promote the sale of California olive oil, published a report funded by California olive oil producers and companies. The purpose of the report was to make news that would discredit their competition – imported olive oils. The now-infamous report claimed "*69 percent of imported olive oil samples and 10 percent of California olive oil samples labeled as extra virgin olive oil failed to meet the IOC/USDA **sensory** standards for extra virgin olive oil.*" In layman's terms, this means these samples failed a taste test. Sounds pretty fishy that something as subjective as a taste test would be used to determine if an olive oil has been adulterated, doesn't it?

48



Citizen Petition: Standards of Identity for Olive Oil

and Olive-Pomace Oil

49

Olive Oil Has a Fraud Problem– Can the FDA Fix It?

Trade groups are petitioning the federal government to actively enforce standards in the olive oil industry.

By **Mike Pomranz** Updated November 07, 2019

The AOOPA and Deoleo—the world's largest olive oil producer known for America's best-selling Bertolli brand among others—submitted a citizen petition to the FDA asking for "science-based, enforceable standards for olive oil," a product the FDA has never regulated before.

"Buying quality extra virgin olive oil is hard, but not because there aren't quality products on supermarket shelves. It's because there are just no rules to stop bad actors from misrepresenting what they're selling"

- Chairman of the American Olive Oil Producers Association

50

Capital Press

UC-Davis study scrutinizes quality of avocado oils

Most avocado oils sold in the U.S. are stale or impure, researchers say. Some of them contain hardly any avocado at all, they say. Avocado oil ...

1 week ago

UC Davis

Study Finds 82 Percent of Avocado Oil Rancid or Mixed With ...

But according to new research from food science experts at the University of California, Davis, the vast majority of avocado oil sold in the U.S. is ...

Jun 15, 2020

Woodland Daily Democrat

Study finds most avocado oil is rancid

A UC Davis study has found that most avocado oil sold in the United States is of poor quality or mislabeled. ASSOCIATED PRESS ARCHIVES.

Jun 15, 2020

MinnPost

Most avocado oil sold in US is either rancid or contains other oils, study finds

... scientist at the University of California, Davis, in a released statement. "But because there are no standards to determine if an avocado oil is ...

Jun 24, 2020

New Food

Shocking number of avocado oils sold in US are rancid or ...

In what is said to be the country's first extensive study of commercial avocado oil quality and purity, the UC Davis team report that as much as ...

Jun 18, 2020

The New Food Economy

Avocado oil is booming. Most of it is rancid.

... at the University of California, Davis, researchers tested 22 commercially available samples of extra virgin, virgin, and refined avocado oil for ...

Jun 17, 2020

SciTechDaily

Warning on Avocado Oil Sold in the U.S.: 82% Tested Rancid or Mixed With Other Oils

In first extensive study of commercial avocado oil quality and purity, UC Davis researchers find majority impure or stale. Food scientist says ...

Jun 17, 2020

Olive Oil Times

82 Percent of Avocado Oil Adulterated, Mislabeled or Poor Quality, Study Finds

The UC Davis study confirmed findings from avocado oil producers' own independent surveys of the market. Hannam explained his company's ...

Jun 22, 2020

National Post

Avofraudo: 'Vast majority' of avocado oil is either rancid or ...

... a new study conducted at the University of California, Davis (UC Davis) found that "the vast majority" of avocado oils sold in the U.S. fall short.

Jun 23, 2020

Foodprocessing

US study: 82% of avocado oil either rancid or adulterated

In the study, UC Davis researchers reported that at least 82% of test samples were either stale before expiration date or mixed with other oils. In ...

Jun 22, 2020

51

Avocado oil rising popularity

Global avocado oil market reached $461 million in 2018 and is projected to reach $708 million in the next five yeas.

The market has been primarily driven by nutritional and health benefits associated with the oil.

There are currently no official standards for avocado oil.

Avocado Oil Market: Global Industry Trends, share, size, growth, opportunity and forecast 2019. April, 2019. IMARC Group, ID 4763162.

52

Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT

Avocado oil is made from what part(s) of an avocado?

- Skin
- Flesh
- Pit
- All of above

53

Sample Information

- 22 samples, representative of avocado oils available in the US.
- Extra virgin (EV), refined (R), unspecified (U).
- Price/fl oz varied from $0.25-$2.35 ($8.45-79.4/Liter).

54

Quality

Free fatty acidity (FFA)

Peroxide value (PV)

UV absorbance

Purity

Fatty acids profile (FAP)

Sterols profile

Triacylglycerols (TAG)

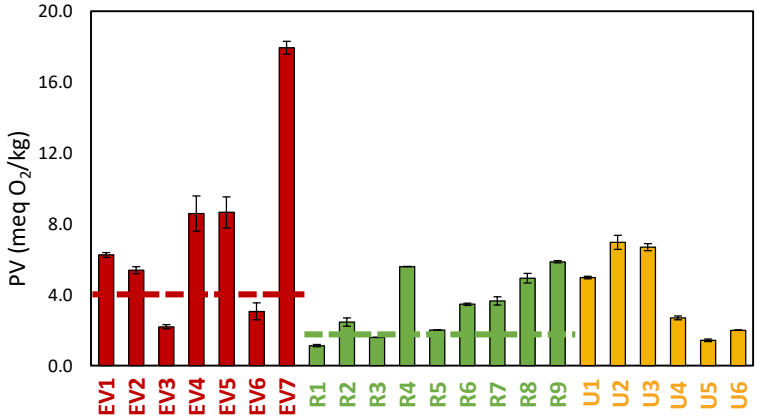
Minor Components

Tocopherols

Chlorophylls

55

Peroxide value: Indicator of oxidation



Dashed lines indicate proposed limits for extra virgin and refined avocado oils.

[1]Refined: ≤ 2.0 meq O_2/kg oil

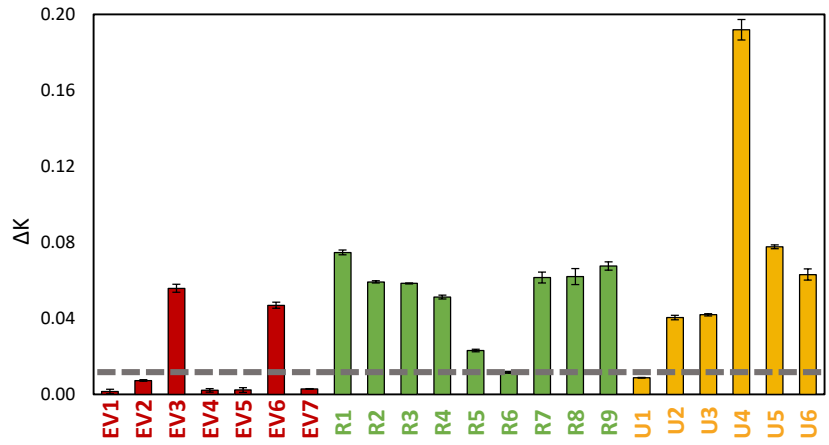
[2]Extra Virgin: ≤ 4.0 meq O_2/kg oil

[1]CODEX proposed standards, 2019.

[2]Woolf (2009). Avocado Oil. *Gourmet and Health-Promoting Specialty Oils*.

56

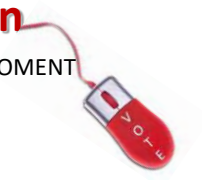
Delta K: Indicator of refining



57

Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT



Which of the following oil does NOT have comparable oleic acid level as avocado oil?

- Olive oil
- Canola oil
- High oleic safflower oil
- Soybean oil

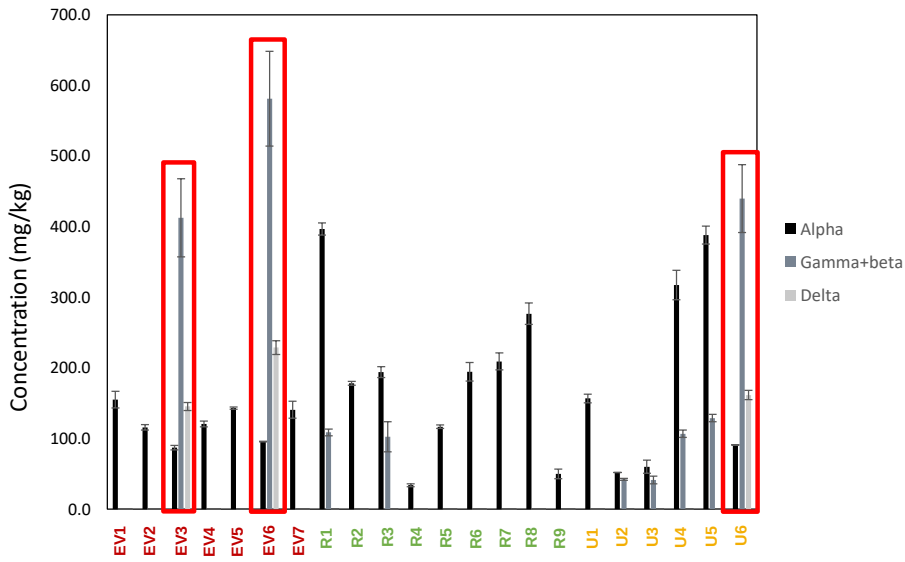
58

Fatty acid profile: Purity Parameter

	C16:0	C16:1	C18:0	C18:1	C18:2	C18:3
EV1	16.5±0.12	6.9±0.01	0.5±0	55.6±0.13	19.2±0.12	1.2±0.01
EV2	15.6±0.01	6.5±0	0.5±0	61±0	15.2±0	1±0
EV3	10.9±0.01	0.1±0.02	4±0.02	21.4±0.15	54.4±0.15	8.2±0.03
EV4	15.5±0	6.4±0.01	0.5±0.01	59.3±0.12	17±0.11	1.1±0.02
EV5	15.6±0.01	6.4±0	0.5±0	58.6±0	17.5±0	1.1±0
EV6	10.4±0.03	0.1±0	3.8±0.01	19.7±0.5	55.4±0.4	9.8±0.05
EV7	16±0.01	6.6±0	0.5±0	62.4±0.01	13.4±0	0.9±0
R1	10±0.02	1.7±0	2.3±0	69.1±0.02	15.2±0	0.5±0
R2	14.7±0.01	5.8±0	1.4±0	64.4±0.07	12.2±0.03	0.7±0.01
R3	13.2±0.03	4.2±0.01	1.4±0	63.8±0.09	16±0.12	0.7±0
R4	15.8±0.01	6.8±0	0.5±0	63.8±0.01	12±0	0.8±0
R5	15±0	6.5±0	0.8±0	63.6±0	12.8±0	0.8±0
R6	17.8±0.03	8.6±0.02	0.6±0	61±0.07	10.9±0.02	0.8±0
R7	14.4±0.01	5.2±0	1.4±0	64.8±0.02	13±0	0.7±0
R8	13.4±0	5.1±0	1.6±0	67.5±0.02	10.9±0.01	0.6±0
R9	14.1±0.01	5.2±0.01	1±0	63.2±0.02	15±0	0.8±0
U1	16.5±0.01	7.4±0.01	1.3±0	63.9±0.01	9.8±0	0.7±0
U2	16.4±0	7.2±0.01	0.6±0	60±0.05	14.7±0.03	0.9±0.01
U3	16.5±0.02	7.4±0	0.6±0	60.4±0.02	13.9±0.01	0.8±0
U4	10.4±0.01	2±0	2.1±0	66.5±0.02	17.4±0.01	0.5±0
U5	11.2±0.02	0.6±0	2.8±0	68.3±0.02	15.4±0	0.5±0
U6	10.9±0	0.1±0	4±0	21±0	54.7±0.01	8.2±0

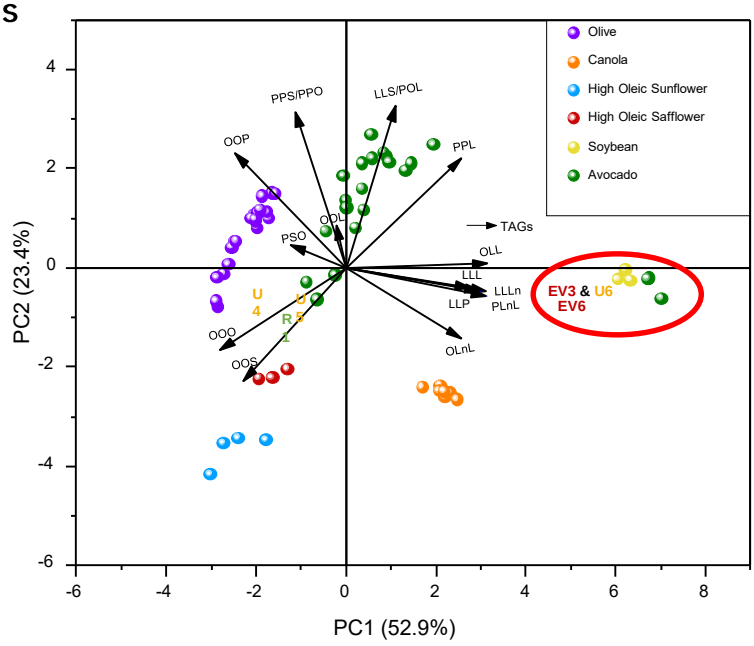
59

Tocopherols (Vitamin E)



60

TAG analysis



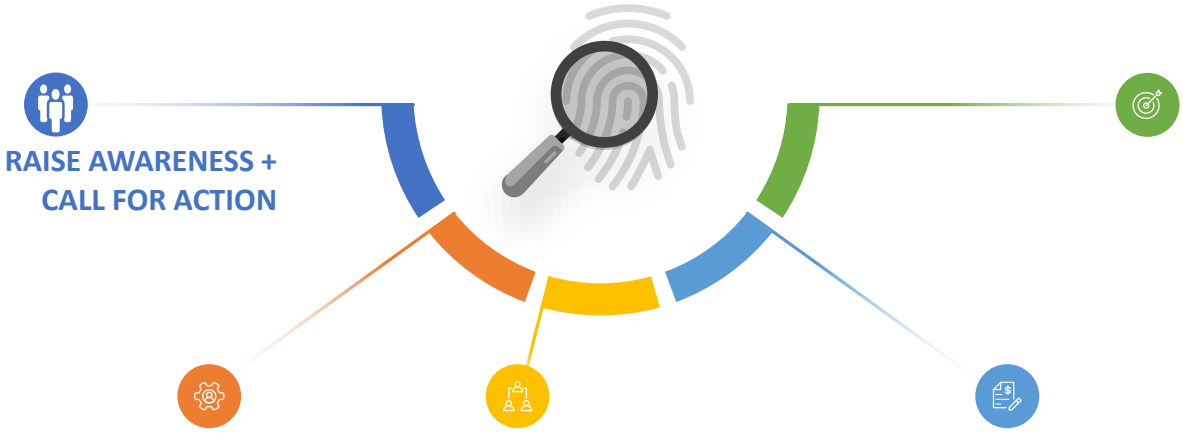
61

Key Findings

- 82% of the samples were of poor quality or adulterated.
- Adulteration with soybean oil was confirmed in three samples (two labelled as EV)
- Adulteration in at least three samples is highly likely.
- More research is needed to understand how chemical compositions change with climate, region, and cultivars.

Green, H. S.; **Wang, S. C.** *Food Control*, **2020,** *116*, 107328: "First report on quality and purity evaluations of avocado oil sold in the US"

62



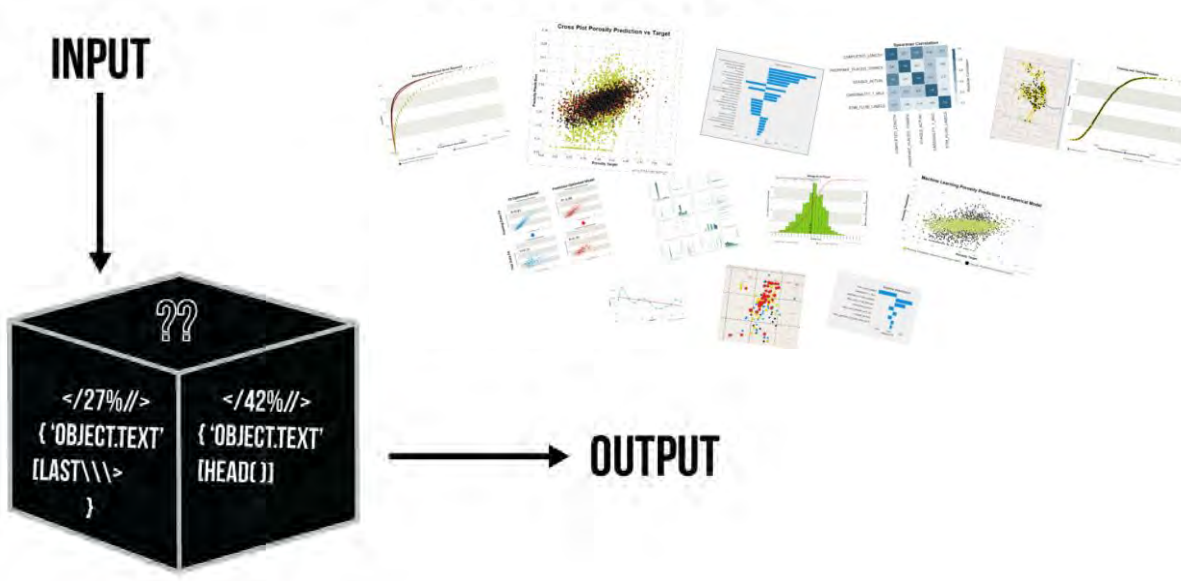
Food fraud compromises consumers trust, reduce livelihood of honest producers, and undermines the credibility of industry and government over the quality and safety of food.

LOOK INTO THE FUTURE

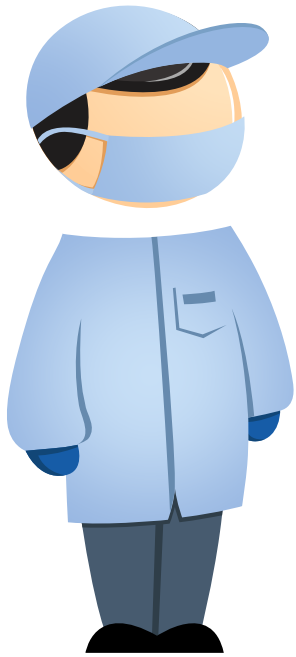
65

66


?


INPUT
??
</27%//>
{ 'OBJECT.TEXT'
[LAST\\\>
}
</42%//>
{ 'OBJECT.TEXT'
[HEAD( )]
OUTPUT

69



Concisely-define standard based on the chemical composition of the authentic product.

Know compositional difference between the authentic and fraudulent food.

Validate analytical methods and develop faster, better and cheaper methods.

70

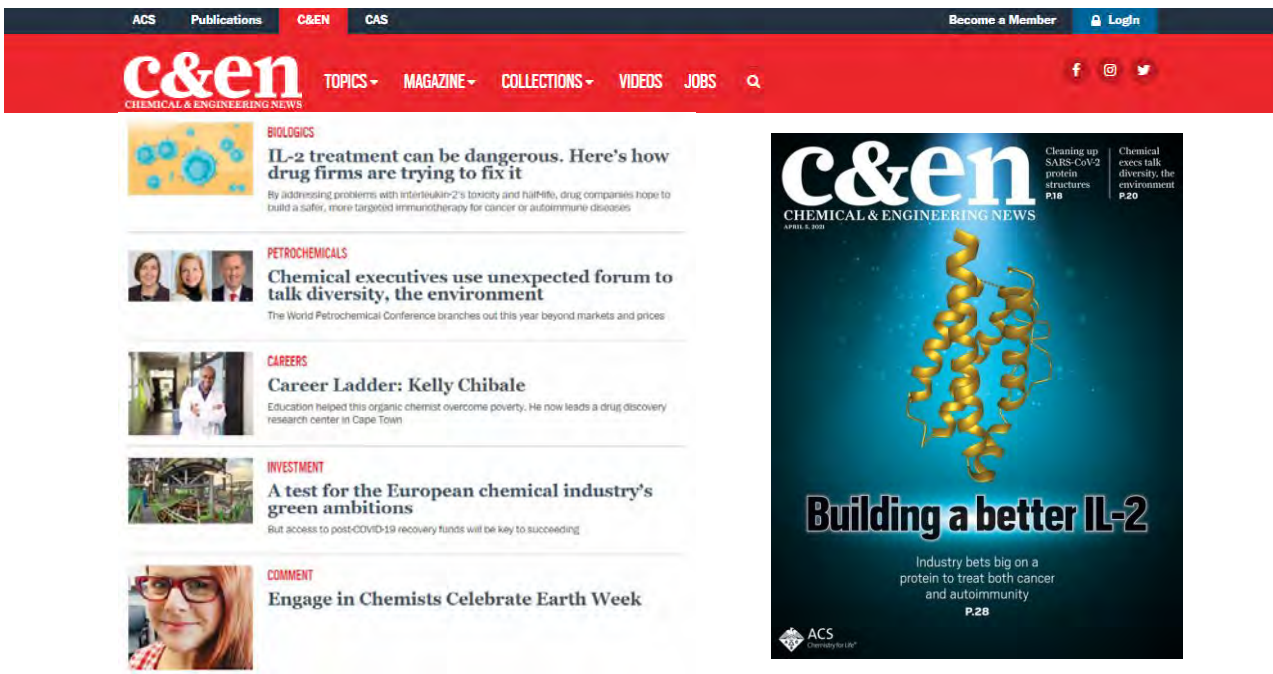
As scientists,

We need to be thorough and thoughtful.

We need to put safety, honesty, justice over fear and greed.

scwang@ucdavis.edu
selinawang.com

71



https://cen.acs.org

72

FREE Webinar | TODAY at 2pm ET

ACS Webinars
CLICK • WATCH • LEARN • DISCUSS

ASK YOUR QUESTIONS AND MAKE YOUR COMMENTS IN THE QUESTIONS PANEL NOW! 73

ACS Webinars
CLICK • WATCH • LEARN • DISCUSS

ACS Chemistry for Life®

Food Fraud: Combating Adulteration in Olive and Avocado Oils

Selina Wang
Faculty, Department of Food Science and Technology, University of California, Davis

Britt Erickson
Senior Editor,
Chemical & Engineering News

Presentation slides are available now! The edited recording will be made available as soon as possible.

www.acs.org/acswebinars

This ACS Webinar is co-produced with Chemical & Engineering News.

74

74

ACS Webinars
CLICK • WATCH • LEARN • DISCUSS

ACS Chemistry for Life®

Date: Thursday, April 8, 2021 @ 1-2pm ET
Speaker: Robert Fry, Robert Fry Economics LLC
Moderator: Keith Wing, Keith Wing Consulting

Register for Free!

What You Will Learn:

- The future of domestic manufacturing and chemical industry
- The speed and timing of the recovery of the 2020 recession
- The long-term implications of the COVID-19 pandemic and the policy response to it

Co-produced with: The Science History Institute and *Chemical & Engineering News*

Date: Wednesday, April 14, 2021 @ 2-3:30pm ET
Speakers: Timothy Long, Arizona State University and Amy Peterson, The University of Massachusetts Lowell
Moderator: Bryan Vogt, Penn State University

Register for Free!

What You Will Learn:

- Fundamental understanding of the five platforms for additive manufacturing of polymers
- Awareness of the synergy of designing polymer reactivity with tailored functionality, required process viscosity that aligns with various printing platforms, and the opportunities for resolution and geometric control of printed objects
- Appreciation for current trends in the literature for additive manufacturing of polymers and the design of polymer structure for rapidly emerging printing platforms

Co-produced with: *ACS Applied Polymer Materials* and the ACS Division of Polymer Chemistry

Date: Thursday, April 15, 2021 @ 2-3pm ET
Speaker: Jordan Harshman, Auburn University and Anne Kondo, Indiana University Pennsylvania
Moderator: Marian Gindy, Merck

Register for Free!

What You Will Learn:

- What collaborative work involves
- What team skills employers expect
- How professional skills are acquired

Co-produced with: ACS Education

www.acs.org/acswebinars

75

Learn from the best and brightest minds in chemistry! Hundreds of webinars on diverse topics presented by experts in the chemical sciences and enterprise.

Edited Recordings are an exclusive ACS member benefit and are made available once the recording has been edited and posted.

Live Broadcasts of ACS Webinars® continue to be available to the general public several times a week generally from 2-3pm ET!

A **collection of the best recordings** from the ACS Webinars Library will occasionally be rebroadcast to highlight the value of the content.

www.acs.org/acswebinars

76

ACS Webinars®does not endorse any products or services. The views expressed in this presentation are those of the presenter and do not necessarily reflect the views or policies of the American Chemical Society.

Contact ACS Webinars ® at acswebinars@acs.org

77

Date: Thursday, April 8, 2021 @ 1-2pm ET
Speaker: Robert Fry, Robert Fry Economics LLC
Moderator: Keith Wing, Keith Wing Consulting

Register for Free!

What You Will Learn:

- The future of domestic manufacturing and chemical industry
- The speed and timing of the recovery of the 2020 recession
- The long-term implications of the COVID-19 pandemic and the policy response to it

Co-produced with: The Science History Institute and *Chemical & Engineering News*

Date: Wednesday, April 14, 2021 @ 2-3:30pm ET
Speakers: Timothy Long, Arizona State University and Amy Peterson, The University of Massachusetts Lowell
Moderator: Bryan Vogt, Penn State University

Register for Free!

What You Will Learn:

- Fundamental understanding of the five platforms for additive manufacturing of polymers
- Awareness of the synergy of designing polymer reactivity with tailored functionality, required process viscosity that aligns with various printing platforms, and the opportunities for resolution and geometric control of printed objects
- Appreciation for current trends in the literature for additive manufacturing of polymers and the design of polymer structure for rapidly emerging printing platforms

Co-produced with: *ACS Applied Polymer Materials* and the ACS Division of Polymer Chemistry

Date: Thursday, April 15, 2021 @ 2-3pm ET
Speaker: Jordan Harshman, Auburn University and Anne Kondo, Indiana University Pennsylvania
Moderator: Marian Gindy, Merck

Register for Free!

What You Will Learn:

- What collaborative work involves
- What team skills employers expect
- How professional skills are acquired

Co-produced with: ACS Education

www.acs.org/acswebinars

78