

# THE CHEMISTRY OF ICE CREAM

Ice cream is a combination of air, ice crystals, fat globules, and a liquid syrup. These are combined to make a colloid, a solution with very small insoluble particles suspended in it. This graphic looks in detail at the components of this colloid, and some molecules that produce ice cream flavours.

## FATS, PROTEINS, & EMULSIFIERS



- LIQUID FAT
- ↑ EMULSIFIED MOLECULES
- ↔ MILK PROTEINS
- FAT CRYSTALS

Fats are important for the creaminess of ice cream. Proteins from milk form a membrane around the fat droplets, making it harder for them to come in contact with each other. Emulsifiers replace some milk proteins on the surface of the fat droplets. As ice cream is made, some of the fat in the droplets solidifies, and the fat 'needles' that form help droplets to partially cluster. These clusters, along with milk proteins, help stabilise air bubbles in the ice cream.

## THE STRUCTURE OF ICE CREAM



During freezing, most water is frozen into ice. Small ice crystals are needed for smooth ice cream. Beating and sieving occur at the same time as freezing to form small air bubbles, stabilised by emulsified fat. Air makes up 30-50% of ice cream's final volume. Sugar sweetens the ice cream, and lowers the freezing point of water, reducing the amount of ice. Soft ice cream contains less ice.



## FLAVOURS AND COLOURS



Natural ice cream flavours contain a number of flavour-contributing compounds. Flavouring can also be achieved artificially. Artificial vanilla flavouring is often simply vanillin; other artificial flavours are more complex. Other compounds can be used as flavour enhancers – an unusual example is oketone, also found in feces, but which has a floral colour at lower concentrations. Colours can be added artificially. Anthocyanins from plants are amongst the colouring agents used.

## STABILISERS



Xanthan gum is the commonest of all plant-based stabilisers that can be extracted from a number of organisms.

Stabilisers are added in small amounts (0.02%) to ice cream. Often extracted from plants, a common example is sodium alginate, the sodium salt of alginic acid, extracted from brown seaweeds. Stabilisers reduce the rate at which ice cream melts, add smoothness, and increase the viscosity of the liquid phase of ice cream; use of multiple stabilisers can produce synergistic effects.

# Chemistry Lab How To Make Ice Cream

**James M. Postma, Julian L. Robert, J.  
Leland Hollenberg**

## Chemistry Lab How To Make Ice Cream:

**Chemistry in Your Kitchen** Matthew Hartings,2020-08-28 Whether you know it or not you become a chemist any time you step into a kitchen As you cook you oversee intricate chemical transformations that would test even the most hardened of professional chemists Focussing on how and why we cook different dishes the way we do this book introduces basic chemistry through everyday foods and meal preparations Through its unique meal by meal organisation the book playfully explores the chemistry that turns our food into meals Topics covered range from roasting coffee beans to scrambling eggs and gluten development in breads The book features many experiments that you can try in your own kitchen such as exploring the melting properties of cheese retaining flavour when cooking and pairing wines with foods Through molecular chemistry biology neuroscience physics and agriculture the author discusses various aspects of cooking and food preparation This is a fascinating read for anyone interested in the science behind cooking

**Chemistry** Eugene LeMay, Jr.,Herbert

Beall,Karen M. Robblee,Douglas C. Brower,Prentice-Hall Staff,2002-02 **Chemistry in the Laboratory** James M. Postma,Julian L. Robert,J. Leland Hollenberg,2004-03-12 This clearly written class tested manual has long given students hands on experience covering all the essential topics in general chemistry Stand alone experiments provide all the background introduction necessary to work with any general chemistry text This revised edition offers new experiments and expanded information on applications to real world situations

*Food52 Genius Recipes* Kristen Miglore,2015-04-07 There are good recipes and there are great ones and then there are genius recipes ONE OF THE NEW YORKER S FIFTEEN ESSENTIAL COOKBOOKS Genius recipes surprise us and make us rethink the way we cook They might involve an unexpectedly simple technique debunk a kitchen myth or apply a familiar ingredient in a new way They re handed down by luminaries of the food world and become their legacies And once we ve folded them into our repertoires they make us feel pretty genius too In this collection are 100 of the smartest and most remarkable ones There isn t yet a single cookbook where you can find Marcella Hazan s Tomato Sauce with Onion and Butter Jim Lahey s No Knead Bread and Nigella Lawson s Dense Chocolate Loaf Cake plus dozens more of the most talked about just crazy enough to work recipes of our time Until now These are what Food52 Executive Editor Kristen Miglore calls genius recipes Passed down from the cookbook authors chefs and bloggers who made them legendary these foolproof recipes rethink cooking tropes solve problems get us talking and make cooking more fun Every week Kristen features one such recipe and explains just what s so brilliant about it in the James Beard Award nominated Genius Recipes column on Food52 Here in this book she compiles 100 of the most essential ones nearly half of which have never been featured in the column with tips riffs mini recipes and stunning photographs from James Ransom to create a cooking canon that will stand the test of time Once you try Michael Ruhlman s fried chicken or Yotam Ottolenghi and Sami Tamimi s hummus you ll never want to go back to other versions But there s also a surprising ginger juice you didn t realize you were missing and will want to put on everything and a way to cook white chocolate that

finally exposes its hidden glory Some of these recipes you ll follow to a T but others will be jumping off points for you to experiment with and make your own Either way with Kristen at the helm revealing and explaining the genius of each recipe Genius Recipes is destined to become every home cook s go to resource for smart memorable cooking because no one cook could have taught us so much **Applying Food and Other Household Materials to Beginning Chemistry**

**Experiments** Deborah Ann Pudell,2000 The Complete Home Learning Sourcebook Rebecca Rupp,1998 Lists all the resources needed to create a balanced curriculum for homeschooling from preschool to high school level *International Handbook of Research on STEAM Curriculum and Practice* Stephen J. Farenga,Salvatore G. Garofalo,Daniel Ness,2025-10-24 This comprehensive handbook delves into curriculum praxis human development and cognition within the contexts of the STEAM disciplines science technology engineering arts architecture and mathematics Cutting edge research will help educators identify best practice techniques for developing students knowledge in STEAM subjects as well as capture contemporary social and political issues within the STEAM context Drawing on the work of over 50 international contributors this volume covers both emergent and established areas of research giving voice to newcomers to the field as well as perspectives from established experts These areas are divided into five sections on foundations content teaching and learning throughout the lifespan equity and enrichment and settings Each topic is considered in both its historical and current context with a focus on the interconnections between theory and practice This book offers a first of its kind overview of STEAM curriculum development which will be especially useful to educational practitioners and researchers of STEAM subjects as well as teacher educators overseeing STEAM education This resource will also be useful for K 12 school and institutional libraries as reference material and for curriculum specialists and administrators seeking to identify methods of best educational practices within STEAM Ebook: Chemistry: The Molecular Nature of Matter and Change

Silberberg,2015-01-16 Ebook Chemistry The Molecular Nature of Matter and Change **Chemical Engineer** ,1915

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