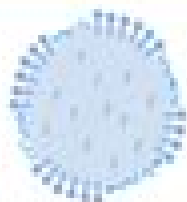


# THE CHEMISTRY OF ICE CREAM

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
- ↑ EMULSIFIER 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 protein on the surface of the fat droplet. As ice cream is made, some of the fat in the droplet 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



● ICE CRYSTALS	30%
● AIR BUBBLES	10%
■ FAT DROPLETS	2%
■ LIQUID SYRUP	8%

% by volume for typical composition

During freezing, most water is frozen into ice. Small ice crystals are needed for smooth ice cream. Beating and aeration occur at the same time as freezing to form small air bubbles, stabilised by de-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



Vanillin



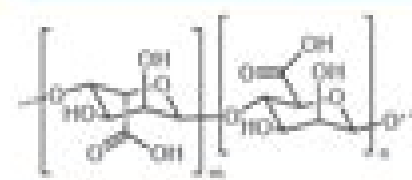
Vanillin



Vanillin

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 diethyl, 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



Alginic acid

Sodium alginate is the sodium salt of alginic acid. Another stabiliser that can be obtained from seaweed is carrageenan.

Stabilisers are added in small amounts (~0.2%) 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**

A decorative graphic element consisting of a red and white circular shape, resembling a stylized 'C' or a partial circle, positioned to the right of the authors' names.

## **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

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**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

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