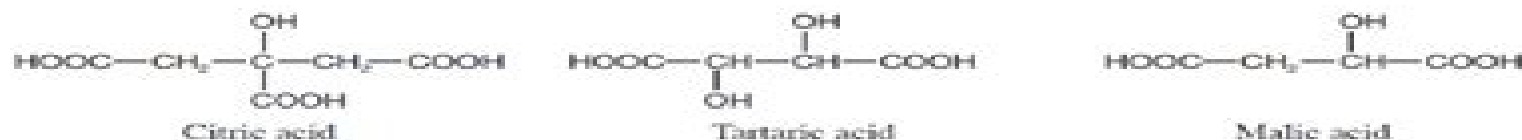


## Acidity of Beverages Lab

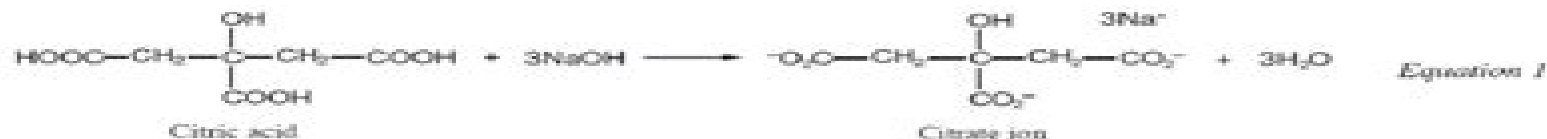
**Introduction:** Common beverages may be either acidic or basic. Fruit juices, for example, get their sweet taste from sugars and their sour or tart taste from weak acids such as citric acid. If the juice contains too much sugar, it will taste bland, but too much acid and the juice will taste sour. The concentration of acids in various consumer beverages may be determined by titration with sodium hydroxide.

**Background:** The main acids present in fruits and fruit juices are citric acid (in citrus fruits), tartaric acid (in grapes), and malic acid (in apples). All of these are characterized as weak acids.



**Figure 1.** Organic acids in fruits and fruit juices

The amount of citric acid in citrus fruit juices can be determined by titration with a standard solution of sodium hydroxide. A standard solution is one whose concentration is accurately known, usually to three significant figures. Citric acid is a tricarboxylic acid—it has three ionizable or “active” hydrogen atoms in its structure. One mole of citric acid therefore reacts with three moles of sodium hydroxide via the acid-base neutralization reaction shown in Equation 1.



Acid-base titrations are an extremely useful technique to determine the concentration of an acid or base in a sample. In titrating beverages such as orange juice, apple juice, and sodas that contain weak acids, the juice is called the analyte and a strong base is used as the titrant.

In the titration procedure, a sodium hydroxide solution of known molarity is carefully added using a buret to a measured volume of fruit juice containing an indicator. The exact volume of sodium hydroxide that must be added to reach the indicator endpoint is measured and then used to calculate the concentration of citric acid in the juice.

A sample setup for a titration is shown in Figure 2 on the next page, where a buret containing the titrant is clamped to the support stand and a beaker or flask containing the analyte is set on a stir plate. If a pH probe is inserted into the solution, a titration curve can be constructed by plotting the pH of the solution on the y-axis versus the volume of titrant added on the x-axis. The shape of the titration curve may be used to distinguish strong and weak acids in the analyte, and also permits graphical analysis of the equivalence point. At the equivalence point, moles of added titrant are stoichiometrically related to moles of analyte in the sample.

# Acidity Of Beverages Lab

**Rosa Lidia Solís-Oviedo, Ángel De La  
Cruz Pech-Canul**



## **Acidity Of Beverages Lab:**

**Microbiology of Ethnic Fermented Foods and Alcoholic Beverages of the World** Jyoti Prakash Tamang, Wilhelm Heinrich Holzapfel, Giovanna E. Felis, Dong Hwa Shin, 2019-11-04      **Fermentation Biotechnology for Functional Foods** Kalidas Shetty, Lena Gálvez Ranilla, 2025-10-31 Fermentation based processing advanced with global food systems as humanity started to organize the domestication of agriculture from plant and animal sources These advances emerged across regions of the world from river valley civilizations in Asia Mesopotamia India and China and Africa Egypt to Meso American civilizations As food crops and animal foods emerged from domestication to advancements in post harvest processing stages growth of invisible microbial systems led to modified foods that aligned with local palates of the communities This in several cases became part of food systems as it added a mode of preservation and improved the food quality that was preferred by each community This is how the early genesis of fermented foods from grains fruits and vegetables to animal meats and milk products became an integral part of early civilizations over 4000 years ago and has now carried over and further developed across many countries in every region of the world The foundations of these food fermentations are now an integral part of modern food advances as preferred food substrates and the microbial interactions that drive the metabolic processes in defined food matrixes are being scientifically advanced This book focuses on bringing together diverse emergences and advancements of fermented foods across different regions of the world and how the metabolic processes associated with fermentation in several cases add health relevant functional qualities across different food matrixes This book contains 26 chapters from the Americas Africa Europe and Asia bringing together the fermentation processes of diverse food substrates and their microbial processing and in several cases providing health targeted functional benefits Key Features Discusses the rationale and basis of fermented food systems from across 26 diverse regions of the world with examples from the Americas Asia Europe and Africa Presents historical plant and animal food substrates and the metabolic processes of their fermentation across traditions of a range of countries Covers traditional food fermentations across diverse food substrates that have potentially health relevant functional benefits Reflects and presents the role of historical cultural and traditional food concepts of a diverse range of countries with many novel examples and how they have influenced health relevant functional benefits Discusses the relevance of metabolic concepts of fermented and functional foods in advancing healthy food concepts This book is important for food scientists nutritionists and the health care sector but beyond this it is also relevant for a wider global audience interested in a holistic health approach from food systems where examples of fermentation experience can inform new natural processing strategies to improve food quality and health      **Probiotic Beverages** Sandeep K. Panda, Julie Kellershohn, Inge Russell, 2021-04-29 Probiotic Beverages is an essential reference guide to traditional emerging and unique probiotic beverage products throughout different regions of the world The book includes in depth knowledge by local authors on indigenous and commercially produced probiotic beverages and related products

Examining current advancements in probiotic beverages and consumer health relationships with a focus on large scale beverage technology sections cover starter cultures regulatory challenges genetic engineering quality and safety From practical issues of developing probiotic beverages to the marketing of these drinks to the consumer the full product lifecycle of a probiotic beverage is discussed Describes probiotic beverages of different geographical locations market status and scope Discusses the potential of probiotic beverages in preventing disease Covers controversial regulatory matters labeling claims GMO free and sustainability Includes dairy nondairy cereal and fruit beverages

*Fermented Food Products A.* Sankaranarayanan,N. Amaresan,D. Dhanasekaran,2019-12-06 Fermented food play an important proactive role in the human diet In many developing and under developed countries fermented food is a cheap source of nutrition Currently more than 3500 different fermented foods are consumed by humans throughout the world many are indigenous and produced in small quantities however the consumption of many fermented foods has gradually increased Fermented Food Products presents in depth insights into various microbes involved in the production of fermented foods throughout the world It also focuses on recent developments in the fermented food microbiology field along with biochemical changes that are happening during the fermentation process Describes various fermented food products especially indigenous products Presents health benefits of fermented food products Explains mechanisms involved in the production of fermented foods Discusses molecular tools and its applications and therapeutic uses of fermented foods The book provides a comprehensive account about diversified ethnic fermented food products Readers will get updated information regarding various types of fermented food products and will learn the effect these fermented food products have on human health

**Food Microbial Sustainability** Arun Karnwal,Abdel Rahman Mohammad Said Al-Tawaha,2023-09-23 This book reviews all important aspects of Microbial sustainability in food production and food safety with the aim of shedding new light on these microbes through combined understanding of traditional and novel paradigms The book is divided into three sections the first of which reinterprets fundamentals of food microbiology examining the beneficial aspects of microorganisms in food and microbial responses from food environments and preservation The second section discusses recent advances in understanding of the sustainable food production covering for example agriculturally important microbes farming microbes and fermentation A wide range of bio factory issues in food production are also addressed before turning attention to contemporary food safety approaches in the context of novel assessment methods for microbiological food characterization improving food safety and food quality etc The final section is devoted to public health and its importance of microorganisms in food processing as well as the economic importance of microorganisms as this is also an increasingly important area as we move toward microbial research advances

*Handbook of Fermented Food and Beverage Technology Two Volume Set* Y. H. Hui,E. Özgül Evranuz,2012-05-21 Fermented food can be produced with inexpensive ingredients and simple techniques and makes a significant contribution to the human diet especially in rural households and village communities worldwide Progress in the biological and

microbiological sciences involved in the manufacture of these foods has led to commercialization and heightened interest

Handbook of Plant-Based Fermented Food and Beverage Technology, Second Edition Y. H. Hui, E. Özgül

Evranuz, 2012-05-17 Fermented food can be produced with inexpensive ingredients and simple techniques and makes a significant contribution to the human diet especially in rural households and village communities worldwide Progress in the biological and microbiological sciences involved in the manufacture of these foods has led to commercialization and heightened interest among scientists and food processors Handbook of Plant Based Fermented Food and Beverage Technology Second Edition is an up to date reference exploring the history microorganisms quality assurance and manufacture of fermented food products derived from plant sources The book begins by describing fermented food flavors manufacturing and biopreservation It then supplies a detailed exploration of a range of topics including Soy beverages and sauce soymilk and tofu Fruits and fruit products including wine capers apple cider and juice mangos olive fruit and noni fruits Vegetables and vegetable products including red beet juice eggplant olives pickles sauerkraut and jalapeño peppers Cereals and cereal products including fermented bread sourdough bread rice noodles boza Chinese steamed buns whiskey and beer Specialty products such as balsamic vinegar palm wine cachapa brick tea shalgam coconut milk and oil coffee and probiotic nondairy beverages Ingredients such as proteolytic bacteria enzymes and probiotics Fermented food products play a critical role in cultural identity local economy and gastronomical delight With contributions from over 60 experts from more than 20 countries the book is an essential reference distilling the most critical information on this food sector *Frontiers and New Trends in the Science of Fermented Food and Beverages* Rosa Lidia Solís-Oviedo, Ángel De La Cruz

Pech-Canul, 2019-02-20 From time immemorial fermented foods have undoubtedly contributed to the progress of modern societies Historically ferments have been present in virtually all human cultures worldwide and nowadays natives from many ancient cultures still conduct a wide variety of food fermentations using deep rooted recipes and processes Within the last four centuries scientific research has started to unravel many aspects of the biological process behind fermentations which has contributed to the improvement of many industrial processes During our journey in the research field we have always been attracted to the development of scientific research around fermentations especially autochthonous ferments a natural repository of novel biomolecules and biological processes that will positively impact on many application fields from health to food to materials

Handbook of Alcoholic Beverages, 2 Volume Set Alan J. Buglass, 2011-02-14 HANDBOOK OF

ALCOHOLIC BEVERAGES A comprehensive two volume set that describes the science and technology involved in the production and analysis of alcoholic beverages HANDBOOK OF ALCOHOLIC BEVERAGES Technical Analytical and Nutritional Aspects At the heart of all alcoholic beverages is the process of fermentation particularly alcoholic fermentation whereby sugars are converted to ethanol and many other minor products The Handbook of Alcoholic Beverages tracks the major fermentation process and the major chemical physical and technical processes that accompany the production of the

world's most familiar alcoholic drinks Indigenous beverages and small scale production are also covered to a significant extent The overall approach is multidisciplinary reflecting the true nature of the subject Thus aspects of biochemistry biology including microbiology chemistry health science nutrition physics and technology are all necessarily involved but the emphasis is on chemistry in many areas of the book Emphasis is also on more recent developments and innovations but there is sufficient background for less experienced readers The approach is unified in that although different beverages are dealt with in different chapters there is extensive cross referencing and comparison between the subjects of each chapter Appropriate for food professionals working in the development and manufacture of alcohol based drinks as well as academic and industrial researchers involved in the development of testing methods for the analysis and regulation of alcohol in the drinks industry Divided into five parts this comprehensive two volume work presents INTRODUCTION BACKGROUND AND HISTORY a simple introduction to the history and development of alcohol and some recent trends and developments FERMENTED BEVERAGES BEERS CIDERS WINES AND RELATED DRINKS the latest innovations and aspects of the different fermentation processes used in beer wine cider liqueur wines fruit wines low alcohol and related beverages SPIRITS covers distillation methods and stills used in the production of whisky cereal and cane based spirits brandy fruit spirits and liqueurs ANALYTICAL METHODS covering the monitoring of processes in the production of alcoholic beverages as well as sample preparation chromatographic spectroscopic electrochemical physical sensory and organoleptic methods of analysis NUTRITION AND HEALTH ASPECTS RELATING TO ALCOHOLIC BEVERAGES includes a discussion on nutritional aspects both macro and micro nutrients of alcoholic beverages their ingestion absorption and catabolism the health consequences of alcohol and details of the additives and residues within the various beverages and their raw materials

**Functional and Medicinal Beverages** Alexandru Grumezescu, Alina Maria Holban, 2019-06-06 Functional and Medicinal Beverages Volume Eleven in the Science of Beverages series discusses one of the fastest growing sectors in the food industry As the need for research and development increases based on consumer demand the information in this volume is essential This reference includes the latest research trends nutritive and medicinal ingredients and analytical techniques to identify health beneficial elements The contents of the book will bring readers up to date on the field thus making it useful for researchers and graduate students in various fields across the food sciences and technology Highlights new concepts innovative technologies and current concerns in the functional beverages field Covers detailed information on the engineering and processing of novel ingredients for health benefits Includes common and alternative ingredients for juices vegetable blends milk based drinks and probiotic and prebiotic based alternative beverages

Nanoengineering in the Beverage Industry Alexandru Grumezescu, Alina Maria Holban, 2019-10-10 Nanoengineering in the Beverages Industry Volume 20 in the Science of Beverages series presents the impact of novel technologies in nanoengineering on the design of improved and future beverages This reference explains how novel approaches of nanoengineering can advance beverage science through proven

research results and industrial applications This multidisciplinary resource will help augment research ideas in the development or improvement of beverage production for a wide audience of beverage science research professionals professors and students Includes up to date information on nanotechnology applications within the beverages industry along with the latest technologies employed Presents various approaches for innovation based on scientific advancements in the field of nanotechnology Provides methods and techniques for research analysis using novel technologies across the globe

**Food Spoilage Microorganisms** Clive de W Blackburn,2006-03-21 The control of microbiological spoilage requires an understanding of a number of factors including the knowledge of possible hazards their likely occurrence in different products their physiological properties and the availability and effectiveness of different preventative measures Food spoilage microorganisms focuses on the control of microbial spoilage and provides an understanding necessary to do this The first part of this essential new book looks at tools techniques and methods for the detection and analysis of microbial food spoilage with chapters focussing on analytical methods predictive modelling and stability and shelf life assessment The second part tackles the management of microbial food spoilage with particular reference to some of the major food groups where the types of spoilage the causative microorganisms and methods for control are considered by product type The following three parts are then dedicated to yeasts moulds and bacteria in turn and look in more detail at the major organisms of significance for food spoilage In each chapter the taxonomy spoilage characteristics growth survival and death characteristics methods for detection and control options are discussed Food spoilage microorganisms takes an applied approach to the subject and is an indispensable guide both for the microbiologist and the non specialist particularly those whose role involves microbial quality in food processing operations Looks at tools techniques and methods for the detection and analysis of microbial food spoilage Discusses the management control of microbial food spoilage Looks in detail at yeasts moulds and bacteria

**Quality Control in the Beverage Industry** Alexandru Grumezescu,Alina Maria Holban,2019-08-15 Quality Control in the Beverage Industry volume 17 in the Science of Beverages series presents a detailed account of the most common aspects and challenges relating to quality control It covers the latest global trends in how to improve beverages using assessment tools authenticity approaches and novel quality control technologies The book presents a great hands on approach for anyone who needs to understand the big picture regarding analytical methods Topics covered include safety the economic impacts of contamination and detection techniques Provides tools to assess and measure sulfites in beverages using different instrumental techniques Presents the application of nanotechnology for the improvement of beverages including taste structure and overall quality Includes analytical procedures for measuring and controlling quality

*Sustainable Production of Ethnic Alcoholic Beverages* Nicolás Oscar Soto-Cruz,Manuel Reinhart Kirchmayr,Avinash Sharma,2022-03-31 **Natural Beverages** Alexandru Grumezescu,Alina Maria Holban,2019-06-21 Natural Beverages Volume Thirteen in the Science of Beverages series takes a multidisciplinary approach to address the shifting beverage

landscape towards the global trend of natural beverages As global beverage consumption has progressed towards healthier and natural ingredients researchers and scientists need to understand the latest scientific developments and the proposed health benefits and improved effects Classical examples are presented as a basis for innovation expansion to help new researchers understand this segment of the industry This is a great resource for researchers and scientists in the beverages industry Describes natural beverage production and its impact on nutritional value Provides overall coverage of hot topics and scientific principles in the beverage industry Explores the pros and cons of natural vs artificial beverages in product development Covers the production of all commonly consumed natural beverages      Safety Issues in Beverage Production Alexandru Grumezescu, Alina Maria Holban, 2019-08-25 Safety Issues in Beverage Production Volume 18 in the Science of Beverages series offers a multidisciplinary approach to the complex issues emerging in the beverage industry The book is broad in coverage and provides the necessary foundation for a practical understanding of the topics that includes recent scientific industry developments that are explained to improve awareness educate and create communication The latest trends in legislation safety management and novel technologies specific to beverages are discussed This resource is ideal as a practical reference for scientists engineers and regulators but can also be used as a reference for courses Provides tools to assess and measure sulfites in beverages using different instrumental techniques Presents applications of nanotechnology to the improvement of beverages including taste structure and overall quality Includes analytical procedures for measuring and controlling quality      **Understanding Wine Chemistry** Andrew L. Waterhouse, Gavin L. Sacks, David W. Jeffery, 2024-05-16 Understanding Wine Chemistry Understand the reactions behind the world's most alluring beverages The immense variety of wines on the market is the product of multiple chemical processes whether acting on components arising in the vineyard during fermentation or throughout storage Winemaking decisions alter the chemistry of finished wines affecting the flavor color stability and other aspects of the final product Knowledge of these chemical and biochemical processes is integral to the art and science of winemaking Understanding Wine Chemistry has served as the definitive introduction to the chemical components of wine their properties and their reaction mechanisms It equips the knowledgeable reader to interpret and predict the outcomes of physicochemical reactions involved with winemaking processes Now updated to reflect recent research findings most notably in relation to wine redox chemistry along with new Special Topics chapters on emerging areas it continues to set the standard in the subject Readers of the second edition of Understanding Wine Chemistry will also find Case studies throughout showing chemistry at work in creating different wine styles and avoiding common adverse chemical and sensory outcomes Detailed treatment of novel subjects like non alcoholic wines non glass alternatives to wine packaging synthetic wines and more An authorial team with decades of combined experience in wine chemistry research and education Understanding Wine Chemistry is ideal for college and university students winemakers at any stage in their practice professionals in related fields such as suppliers or sommeliers and chemists with an interest in wine      *Latin-American*



*Seeds* Claudia M. Haros, María Reguera, Norma Sammán, Octavio Paredes-López, 2023-05-02 In the last few years the Latin American seeds have gained increased importance also due to the increased demand for gluten free foods Worldwide demand for Latin American seeds and grains has risen in a high proportion In parallel seeds and grains research from this region in all relevant fields has been intensified Latin American Seeds Agronomic Processing and Health Aspects summarizes the recent research on Latin American crops regarding agronomic and botanical characteristics composition structure use production technology and impact on human health Latin American cultivars studied here are included in the groups of cereals pseudo cereals oilseeds and legumes that are used in a great variety of innovative and traditional foods The main crops that are covered in this book are Latin American maize *Zea mays* amaranth *Amaranthus* spp quinoa *Chenopodium* spp ka iwa *Chenopodium pallidicaule* chia *Salvia hispanica* sacha inchi *Plukenetia volubilis* and legumes such as black turtle and common beans *Phaseolus vulgaris* and tarwi *Lupinus mutabilis* Key Features Contains updated information about recent research works on Latin American crops Includes a variety of Latin American plant species that are used in a great variety of innovative and traditional foods Addresses a wide range of topics related to agronomy plant physiology and nutritional and technological properties processing fractionation and development of new products for human health **Food Toxicology** Debasis Bagchi, Anand Swaroop, 2016-11-25 Food toxicology studies how natural or synthetic poisons and toxicants in diverse food products cause harmful detrimental or adverse side effects in living organisms Food toxicology is an important consideration as food supply chain is becoming more multinational in origin and any contamination or toxic manifestation may cause serious wide spread adverse health effects Food Toxicology covers various aspects of food safety and toxicology including the study of the nature properties effects and detection of toxic substances in food and their disease manifestations in humans It will also include other aspects of consumer product safety The first two chapters discuss the measurement of toxicants and toxicity and the importance of dose response in food toxicology Additional chapters discuss the aspects of food associated carcinogenesis and food derived chemical carcinogenesis food allergy pathogens associated with fruits and vegetables and the detrimental effects of radionuclides exposure The chapters also cover the most important heavy metal contaminants namely mercury lead and vanadium and Fluoride toxicity which is extensively discussed in its own chapter Toxicologists scientists researchers in food toxicology nutritionists and public health care professionals will find valuable information in this book on all possible intricate areas of food toxicology Lactic Acid Bacteria Gabriel Vinderola, Arthur Ouwehand, Seppo Salminen, Atte von Wright, 2019-04-08 Through four editions Lactic Acid Bacteria Microbiological and Functional Aspects has provided readers with information on the how s and why s lactic acid producing fermentation improves the storability palatability and nutritive value of perishable foods Thoroughly updated and fully revised with 12 new chapters the Fifth Edition covers regulatory aspects globally new findings on health effects properties and stability of LAB as well as production of target specific LAB The new edition also addresses the technological use of LAB in various

fermentations of food feed and beverage and their safety considerations It features the detailed description of the main genera of LAB as well as such novel bacteria as fructophilic LAB and novel probiotics and discusses such new targets as cognitive function metabolic health respiratory health and probiotics Key Features In 12 new chapters findings are presented on health effects properties and stability of LAB as well as production of target specific LAB Covers such novel bacteria as fructophilic LAB and novel probiotics Presents new discoveries related to the mechanisms of lactic acid bacterial metabolism and function Covers the benefits of LAB both in fermentation of dairy cereal meat vegetable and silage and their health benefits on humans and animals Discusses the less known role of LAB as food spoilers Covers the global regulatory framework related to safety and efficacy

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