



## Stability of Common Insulins in Vials and Pens<sup>1,2</sup>

Insulin Vials	Stability Unopened and Stored in the Refrigerator	Opened at Room or Refrigerator Temperature (days) <sup>1</sup>	Unopened at Room Temperature (days) <sup>1</sup>	Image
<b>Rapid-Acting Insulin</b>				
Novolog (aspart)	The expiration date on the label	28	28	
Humalog (lispro)	The expiration date on the label	28	28	
Apidra (glulisine)	The expiration date on the label	28	28	
<b>Short-Acting Insulin</b>				
Humulin R (regular)	The expiration date on the label	31	31	
Novolin R (regular)	The expiration date on the label	42 Do not refrigerate	42	
Humulin R U-500	The expiration date on the label	40	40	
<b>Intermediate-Acting Insulin (NPH)</b>				
Humulin N	The expiration date on the label	31	31	

Originally prepared by: Brandon Flohr Pharm.D. Candidate

Originally edited by: Janice Li Pharm.D. Candidate

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# Stability Of Insulin

**Bernard Testa, Joachim M. Mayer**



## Stability Of Insulin:

Stability of Insulin Jens Brange, 1994-12-31 A major challenge confronting the pharmaceutical scientist working with protein formulation is the instability during processing storage and use of the protein drug This book reviews stability aspects encountered since the pioneering isolation of insulin in 1921 An introductory chapter treating insulin purity and stability in historical perspective is followed by a chapter with a description of the structure of insulin The main part of the book is a comprehensive review of the literature dealing with stability of insulin in pharmaceutical formulation including biological stability and the physical and chemical decomposition of insulin The physical stability i e the tendency of insulin to form insoluble fibrils is reviewed as are methods to stabilize insulin for long term use in infusion pumps The book will be of interest to research and clinical pharmacologists involved with insulin and other protein based drug substances

**Thermostability of human insulin** World Health Organization, 2024-03-28 Diabetes is an escalating global health crisis that is expected to impact 1.3 billion people by 2050 Diabetes prevalence is predicted to increase even more steeply in low and middle income countries LMICs Between 2000 and 2019 there was a 3% increase in age standardized mortality rates from diabetes In lower middle income countries the mortality rate due to diabetes increased by 13% Of those with diabetes approximately 9 million people globally live with type 1 diabetes and thus require insulin In addition about 60 million people with type 2 diabetes need insulin to achieve optimal glycaemic control but only about 50% of these individuals are able to access this medication

**Pharmaceutical Biotechnology** Daan J. A. Crommelin, Robert D. Sindelar, Bernd Meibohm, 2016-04-19 Completely revised text that reflects to emergent trends and cutting edge advances in pharmaceutical biotechnology this Third Edition provides a well balanced framework for understanding every major aspect of pharmaceutical biotechnology including drug development production dosage forms administration and therapeutic developments New chapter *Hydrolysis in Drug and Prodrug Metabolism* Bernard Testa, Joachim M. Mayer, 2003-08 Many drugs and other xenobiotics e.g. preservatives insecticides and plastifiers contain hydrolyzable moieties such as ester or amide groups In biological media such foreign compounds are therefore important substrates for hydrolytic reactions catalyzed by hydrolases or proceeding non enzymatically Despite their significance until now no book has been dedicated to hydrolysis and hydrolases in the metabolism of drugs and other xenobiotics This work fills a gap in the literature and reviews metabolic reactions of hydrolysis and hydration from the point of views of enzymes substrates and reactions

**Handbook of Pharmaceutical Biotechnology** Shayne Cox Gad, 2007-05-23 A practical overview of a full range of approaches to discovering selecting and producing biotechnology derived drugs The Handbook of Pharmaceutical Biotechnology helps pharmaceutical scientists develop biotech drugs through a comprehensive framework that spans the process from discovery development and manufacturing through validation and registration With chapters written by leading practitioners in their specialty areas this reference Provides an overview of biotechnology used in the drug development process Covers extensive

applications plus regulations and validation methods Features fifty chapters covering all the major approaches to the challenge of identifying producing and formulating new biologically derived therapeutics With its unparalleled breadth of topics and approaches this handbook is a core reference for pharmaceutical scientists including development researchers toxicologists biochemists molecular biologists cell biologists immunologists and formulation chemists It is also a great resource for quality assurance assessment control managers biotechnology technicians and others in the biotech industry

Delivery Technologies for Biopharmaceuticals Lene Jorgensen,Hanne Morck Nielson,2009-10-23 Advances in biotechnology have provided scientists with an increasing number of biopharmaceuticals such as novel peptide and protein drugs as well as nucleic acid based drugs for gene therapy However successful delivery of these biopharmaceuticals is a major challenge because their molecular properties lead to poor physical and chemical stability in the body and limited membrane permeability Therefore researchers are developing a range of new delivery technologies and materials to enable these new drugs to be delivered intact to their target sites Delivery Technologies for Biopharmaceuticals describes strategies to overcome the main barriers for successful delivery of therapeutic peptides proteins and nucleic acid based drugs or vaccines related to the site of administration and the target site Many of the approaches described are reported in formulations in current clinical trials as well as in marketed products Contents include challenges in delivery of biopharmaceuticals novel formulation approaches for peptide and protein injectables non viral chemical vectors and viral technology for delivery of nucleic acid based drugs immune response adjuvants and delivery systems for vaccines several examples of delivery systems for different biopharmaceuticals a critical assessment of delivery technologies for biopharmaceuticals Delivery Technologies for Biopharmaceuticals is an essential single volume introduction to the technologies used by researchers to ensure efficient delivery of this exciting new class of drugs It will be of value to researchers and students working in drug delivery formulation biopharmaceuticals medicinal chemistry and new materials development Pharmaceutical Formulation Development of Peptides and Proteins Lars Hovgaard,Sven Frokjaer,Marco van de Weert,2012-11-14 The rapid advances in recombinant DNA technology and the increasing availability of peptides and proteins with therapeutic potential are a challenge for pharmaceutical scientists who have to formulate these compounds as drug products Pharmaceutical Formulation Development of Peptides and Proteins Second Edition discusses the development of therap

Advanced Biomaterials in Biomedical Engineering and Drug Delivery Systems Naoya Ogata,Sung W. Kim,Jan Feijen,Teruo Okano,2012-12-06 First of all I would like to share the great pleasure of the successful five day symposium with every participant in the 5th Iketani Conference which was held in Kagoshima from April1S Tuesday to 22 Saturday 1995 Outstanding speakers enthusiastically presented their up to the minute results Relatively little time was allotted for each presentation to ensure asd much time as possible for intensive discussions on the particular topics that had just been p esented I was delighted to see that the lectures were of high quality and the discu ssionswere lively exciting and productive

in a congenial atmosphere We also had 92 papers in the poster session in which young and relatively young scientists made every effort to present the novel results of their research in advanced biomaterials and drug delivery systems DDS I believe some of the research is most promising and will become noteworthy in the twenty first century It was a privilege for me to deliver a lecture at the special session of the symposium In my introductory remarks I pointed out five key terms in multifaceted biomaterials research materials design concept or methodology devices properties demanded and fundamentals I am confident that innovative progress in device manufacturing for end use e g artificial organs vascular grafts and DDS can be brought about only through properly designed advanced materials that exhibit the desired functionality at the interface with any living body

*Handbook of Diabetes Technology* Yves Reznik, 2019-01-31 This book covers the main fields of diabetes management through applied technologies The different chapters include insulin therapy through basic insulin injection therapy external and implantable insulin pumps and the more recent approaches such as sensor augmented pumps and close loop systems Islet transplantation is also described through its technical aspects and clinical evaluation Glucose measurement through blood glucose meters and continuous glucose monitoring systems are comprehensively explained Educational tools including videogames and software dedicated to diabetes management are depicted Lastly Telemedicine systems devoted to data transmission telemonitoring and decision support systems are described and their use for supporting health systems are summarized This book will help professionals involved in diabetes management understanding the contribution of diabetes technologies for promoting the optimization of glucose control and monitoring This volume will be helpful in current clinical practice for diabetes management and also beneficial to students

**Successful Drug Discovery** János Fischer, David P. Rotella, 2015-02-03 The first volume of the book series Successful Drug Discovery is focusing on new drug discoveries during the last decade from established drugs to recently introduced drugs of all kinds small molecule peptide and protein based drugs The role of serendipity is analyzed in some very successful drugs where the research targets of the lead molecule and the drug are different Phenotypic and target based drug discovery approaches are discussed from the viewpoint of pioneer drugs and analogues This volume gives an excellent overview of insulin analogues including a discussion of the properties of rapid acting and long acting formulations of this important hormone The major part of the book is devoted to case histories of new drug discoveries described by their key inventors Eight case histories range across many therapeutic fields The goal of this book series is to help the participants of the drug research community with a reference book series and to support teaching in medicinal chemistry with case histories and review articles of new drugs

**Advances in Marine Chitin and Chitosan** David Harding, Hitoshi Sashiwa, 2018-10-02 This book is a printed edition of the Special Issue Advances in Marine Chitin and Chitosan that was published in Marine Drugs

**Challenges in Delivery of Therapeutic Genomics and Proteomics** Ambikanandan Misra, 2010-09-09 Delivery of therapeutic proteomics and genomics represent an important area of drug delivery research Genomics and proteomics approaches could be used to

direct drug development processes by unearthing pathways involved in disease pathogenesis where intervention may be most successful This book describes the basics of genomics and proteomics and highlights the various chemical physical and biological approaches to protein and gene delivery Covers a diverse array of topics from basic sciences to therapeutic applications of proteomics and genomics delivery Of interest to researchers in both academia and industry Highlights what s currently known and where further research is needed     Drug and Pharmaceutical Biotechnology Mr. Rohit

Manglik,2024-07-04 EduGorilla Publication is a trusted name in the education sector committed to empowering learners with high quality study materials and resources Specializing in competitive exams and academic support EduGorilla provides comprehensive and well structured content tailored to meet the needs of students across various streams and levels

**Insulin pump therapy** Elke Austenat,Tilman Stahl,2019-05-20 No detailed description available for Insulin pump therapy     Advanced Functional Materials for Disease Diagnosis, Drug Delivery and Tissue Repair Liqun Yang,Xianzhi Zhang,2025-04-24 In the contemporary landscape of science and technology the exploration of advanced functional materials is gaining prominence particularly in the realm of biomedicine These materials play a pivotal role in disease diagnosis where nanomaterials serve as contrast agents for magnetic resonance imaging enhancing image resolution and clarity This improvement provides healthcare professionals with a more precise foundation for diagnosis Additionally advanced functional materials find application in biosensors enabling highly sensitive disease detection The versatility of advanced functional materials extends to drug delivery and controlled release aiming to enhance drug efficacy and bioavailability Nano drug carriers for instance can precisely deliver chemotherapeutic drugs to tumour sites minimizing toxic side effects and improving patients quality of life Furthermore these materials serve as carriers for gene therapy and cell therapy opening new avenues for future therapeutic approaches Tissue engineering benefits significantly from advanced functional materials especially biocompatible materials used in crafting medical devices such as artificial organs joints and blood vessels This not only offers improved medical solutions but also expands possibilities in drug carriers and gene therapy within the realm of tissue engineering     **Endocrine System Diseases: New Insights for the Healthcare Professional: 2013 Edition**

,2013-07-22 Endocrine System Diseases New Insights for the Healthcare Professional 2013 Edition is a ScholarlyEditions book that delivers timely authoritative and comprehensive information about Diagnosis and Screening The editors have built Endocrine System Diseases New Insights for the Healthcare Professional 2013 Edition on the vast information databases of ScholarlyNews You can expect the information about Diagnosis and Screening in this book to be deeper than what you can access anywhere else as well as consistently reliable authoritative informed and relevant The content of Endocrine System Diseases New Insights for the Healthcare Professional 2013 Edition has been produced by the world s leading scientists engineers analysts research institutions and companies All of the content is from peer reviewed sources and all of it is written assembled and edited by the editors at ScholarlyEditions and available exclusively from us You now have a source

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Protein Delivery Lynda M. Sanders, R. Wayne Hendren, 2005-11-21 Thirteen chapters by industrial and academic authorities in this rapidly evolving field present detailed case histories and reviews of current sophisticated protein drug delivery technologies Highlights include a comprehensive overview of insulin delivery and a discussion of the use of biodegradable microspheres      **Therapeutic Peptides and Proteins** Ajay K. Banga, 2005-09-14 Upon publication of the first edition of Therapeutic Peptides and Proteins ten years ago there were only 19 biotechnology medicines on the market Currently there are more than 100 with at least 400 more in various stages of development That alone would be grounds for a new edition Add to that the fact that it is still difficult to find up

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