AN ISO 9001 : 2015 CERTIFIED COMPANY

The Complete Book on Glass and Ceramics Technology (2nd Revised Edition)

FREE SAMPLE: contents and introduction of the 624-page book
Price: Rs 1,495 | US$ 39.95

Order the full book >

AN ISO 9001 : 2015 CERTIFIED COMPANY

Author: NIIR Board of Consultants & Engineers
Format: paperback
Code: NI163
Pages: 624
Price: Rs 1,495 | US$ 39.95
Publisher: NIIR PROJECT CONSULTANCY SERVICES
Shipping: 5 days

About the Book

Ceramics also known as fire clay is an inorganic, non-metallic solid article, which is produced by the art or technique of heat and subsequent cooling. The ceramics industry in India came into existence about a century ago and has matured over time to form an industrial base. From traditional pottery making, the industry has evolved to find its place in the market for sophisticated insulators, electronic and electrical items. The ceramic industry has been modernizing continuously, by newer innovations in product design, quality etc.
Glass is an inorganic product typically produced by melting a mixture of silica, soda and calcium compound with desired metallic oxides that serves as coloring agents. Indian glass industry will increase on the sidelines of real estate growth across retail, residential and office estate. Glass production involves the fusion of several inorganic substances. These various substances include products such as silica sand, soda ash, dolomite and limestone, representing together 99% of all the raw materials, excluding recycled glass.
Glass-ceramics are mostly produced in two steps: First, a glass is formed by a glass-manufacturing process. The glass is cooled down and is then reheated in a second step. In this heat treatment the glass partly crystallizes. In most cases nucleation agents are added to the base composition of the glass-ceramic. These nucleation agents aid and control the crystallization process. Glass-ceramics are fine-grained polycrystalline materials formed when glasses of suitable compositions are heat treated and thus undergo controlled crystallization to the lower energy, crystalline state. It is important to emphasize a number of points in this statement on glass ceramics.Glass ceramics has helped the electronics industry build much smaller and highly efficient transistors, leading to advances in all types of devices.
The book covers almost all important aspects of Glass and Ceramic Industry: Properties, Applications, Manufacturing, Processing and Photographs of Plant &Machinery with Supplier's Contact Details. The major contents of the book are types of glasses, silicate glasses, boric oxide and borate glasses, phosphorus pentoxide and phosphate glasses, germanium dioxide and germanate glasses, titanate glasses, nitrate glasses, glasses based on water, halide glasses, modern glass working, monax and pyrex glass, electric welding, photo electric cells, glassy metals, analysis of glass, glass ceramics, ceramics as electrical materials, analysis of ceramics etc.
The book will be useful to the consultants, technocrats, research scholars, libraries and existing units and new entrepreneurswho will find a good base to work further in this field.

Contents

1. GLASS
Structure
Composition
Single-Phase Glasses
Glass-Ceramics and Phase-Separated Glasses
Properties
Manufacture and Processing

2. TYPES OF GLASSES
A. Chemical Composition
B. Devitrification of Fused Silica
1.The Phases of Silica
2. Crystalline Phases Produced by the Devitrification of Fused Silica
3. Effect of Impurities on the Rate of Devitrification of Vitreous Silica
4. Effect of Atmosphere on the Rate of Devitrification
5. Detailed Studies of Devitrification Kinetics
6. Comparison of Calculated and Measured Growth Rates
C. The Kinetics Of Melting Of Quartz And Cristobalite
1. Superheating of Quartz and Cristobalite Melting
2.Evidence for Residual Crystalline Structures in Fused Silica
D. Viscosity of Fused Silica

3. SILICATE GLASSES
A. Binary Systems
1. Alkali Silicate Systems
a. Structural considerations
b.Glass formation in the alkali silicate systems
c.Phase diagrams of the alkali silicate systems
d. The kinetics of devitrification
2. Binary Systems Containing Alkaline Earth Oxides
B. THE NA2O-CAO-SIO2 SYSTEM
1. Structural Considerations
2. The Glass-forming Region
3. The Phase Diagram
4. Devitrification Kinetics
C. SOME SPECIAL SILICATE GLASSES
1. Alkali Aluminosilicates
2. Invert Glasses

4. BORIC OXIDE AND BORATE GLASSES
A. The Preparation and Properties of Boric Oxide Glass
B. Glass Formation in Binary Borate Systems
1. Ranges of Glass Formation
2. Phase Diagrams
3. Chemical Bonding in Systems Containing Highly Polarizable Cations
C. Ternary Systems
1. The Na2O-B2O3-SiO2 System
2. Aluminoborate Systems
D. The Structure of Vitreous Boric Oxide and Borate Glasses

1. Vitreous Boric Oxide
2. Alkali Borate Glasses

5. PHOSPHORUS PENTOXIDE AND PHOSPHATE GLASSES`
A. Phosphorus Pentoxide
1. Structure and Polymorphism
2. Polymorphic Transformations and Melting
3. Viscosity and Melt Allotropy
B. Glass Formation in Binary Phosphate Systems
1. Regions of Glass Formation
2. The Structure of Phosphate Glasses
3. Paper Chromatography of Phosphate Glasses
4. Devitrification Kinetics of Sodium Metaphosphate Glass
5. The Role of B2O3 and Al2O3 in Phosphate Glasses

6. GERMANIUM DIOXIDE AND GERMANATE GLASSES
A. Germanium Dioxide
1. Structure and Allotropy
2. GeO2 Glass : Viscosity
B. Glass Formation in GeO2 systems
1. Experimental Results
2. Phase Diagrams
3. The Structure of Alkali Germanate Glasses and Mels
Tellurite and Vanadate Glasses
A. Tellurite Glasses
1. Glass Formation
2. The Structure of TeO2 and Tellurite Glasses
3. Viscosity of Tellurite Melts: Liquidus Temperatures
B. Vanadate Glasses
1. Glass Formation
2. Liquidus Temperature in Vanadate Systems
3. The Structure of V2O5 and Vanadate Melts
Miscellaneous Oxide Glasses
A. Aluminate Glasses
1. Glass-forming Compositions
2. Liquidus Temperatures; Structure
B. Glasses Base Ga2O3
C. Carbonate Glasses

D. Titanate Glasses
E. Glasses Based on As2O3, Sb2O3 AND Bi2O3
1. Glass-Forming Behaviour of the Oxides
2. Binary Systems
F. Glasses Based on MoO3 AND WO3
G. Sulphate and Selenite Glasses

7. NITRATE GLASSES
A. Glass-Forming Systems
B. The System KNO3-Ca(NO3)2
C. Theories of Glass Formation
1. Structural Considerations

2. Kinetic Considerations
D. The Mechanism of Melting

8. GLASSES BASED ON WATER
A. Vitreous Water
B. The System H2O-H2O
C. Other Aqueous Solutions
D. Structure of Water
E. Hydrogen Bonding in KHSO4

9. HALIDE GLASSES
A. BeF2 Glasses
1. BeF2
2. Model Relationships between Fluorides and Oxides
3. Binary Fluorberyllate Systems
4. Microphase Separation
B. Other Fluoride Glasses
C. ZnCl2 Glasses

10. CHALCOGENIDE GLASSES
A. COMPARISON WITH OTHER SYSTEMS
A. Comparison with Other Systems
B. Structure and Melting Behaviour of Elements in Groups IV, V and VI
C. Sulphur, Selenium and Tellurium
1. Sulphur
2. Selenium
3. Tellurium
D. Binary Glasses
1. Chalcogenides with Group V Elements
2. Chalcogenides with Group IV Elements
E. Ternary Glasses
1. Glasses Based on Arsenic Chalcogenides
2. Glasses Containing Both Group IV and Group V elements
F. Halogen-Containing Glasses
G. Viscosity of Binary Glasses
H. Phase Diagrams of Binary Chalcogenide Systems
I. Structures of Chalcogenide Compounds and Glasses
1. Chalcogenides of Group IV Elements
2. Chalcogenides of Group V Elements
3. Structures of the Chalcogenide Glasses

11. MODERN GLASS WORKING
General Considerations and Equipment
Physical Properties of Glass
General Considerations and Equipment
Physical Properties of Glass
Kinds of Laboratory Glass
Soda-Glass
The Glass Working Flame. The Blowpipe
Other Types of Blowpipe
The Hand Blowpipe

The Compressed Air
The Glass Working Bench
Bloom and Devitrification
Annealing
Storing and Cleaning Glass

12. FUNDAMENTAL OPERATIONS.
Skill
Cutting Glass Tubing
Instruments in use for Starting the Crack
(1) The Glass Knife.
(2) Steel Files.
(3) Specially hardened Steel Wheels.
(4) Diamond.
Methods of Propagating the Crack
(a) Mechanical.
(1) Manual Pressure.
(2) Impact.
(b) The Application of Heat.
(1) The Electrically Heated Hot Wire.
(2) Hot Glass Rod.
(3) The Blowpipe Flame.
(4) Hot Iron Wires.
The Importance of good Glass Cutting
Rotating the Tube in the Flame
Bending Glass Tubing
Bending Wide Tubing
Drawing Out and Constructing A Tube
Bordering
Sealing a Tube
Blowing Bulbs
(a) At the end of a Tube.
(b) In the middle of the Tube.
Joining Two Tubes of the Same Diameter
Method I.
Method II.
To Blow a Hole in the Side of a Tube
Composite Operations
Joining Two Tubes of Unequal Diameters
Blowing Larger Bulbs
(a) From a Bulb in the Middle of a Tube.
(b) From a Larger Tube Sealed On.
T-Joints
Internal Seals
(a) Inner tuber unsupported.
(b) Inner tube supported.
Closed Circuits of Tubing

13. MONAX AND PYREX GLASS
General
Monax Glass

Physical Properties
Cutting
Bending
Blowing
Small Joints
Large Joints
Annealing
Pyrex Glass
Physical Properties
Cutting
Bending
Blowing
Joints
Annealing

14. SEALING METALS INTO GLASS
Platinum
Copper-Clad Wire
Tungsten
Copper to Glass

15. ELECTRIC WELDING
General
Resistance Welding
Strength of Welded Wires
ARC Welding

16. VACCUM TUBES
The Conduction of Gases
The Electrodes
Positive Rays
X-ray Fluorescence
The Fleming Valve
The De Forest Valve

17. PHOTO-ELECTRIC CELLS
General
Photo-Emissive Cells
Cell Construction
Working the Cell
Photo-Voltaic Cells
Cuprous-oxide-copper
Other Semi-Conductors

18. VACUUM TECHNIQUE
Diffusion Pumps
Theory
Jet Design
Working Substance
Jets in Series
Cleaning

Insulation
Heating
Joints
The Importance of Wide Tubing
Use of a Reservoir
Connections and Taps
Precautions

19. LEAKS, OUT-GASSING AND SEALING OFF
Leaks
Out-Gassing
The Electric Furnace
Sealing Off
'Clean-up' and 'Getters'

20. MEASUREMENT OF LOW PRESSURES
The McLEOD Gauge
Construction
Other Indications of Pressure

21. GLASSY METALS
Structure
Properties
Thermal Behaviour
Formation
Preparation
Applications

22. ANALYSIS OF GLASS
Methods of Anylysis
Composition Analysis
Chemical Methods for Individual Constituents
Procedure
Procedure
Procedures
Procedure
Procedures
Procedures
Calculate the zirconium content as zirconium dioxide, ZrO2.
Procedures
Calculate the antimony as antimony trioxide, Sb2O3.
Calculate the antimony content of the sample as antimonous oxide, Sb2O3.
Procedures
Procedures
Redox State Determinations
Chelometry
Procedures
Flame Spectroscopy
Method for Alkali Metals in Glass by Flame Emission Spectrometry.
Procedure
Emission Spectroscopy

X-Ray Emission Spectroscopy
Spark Source Spectrometry
Electroanalytical Methods
Coulometry.
Determination of Properties
Spectrophotometry
Procedure
Procedure
Microscopy
Electron Microprobe Analysis

23. GLASS-CERAMICS
The Glass-Ceramic Process
Properties
Commercial Applications

24. Ceramics
SCOPE

25. RAW MATERIALS
Clays
Nonclay Minerals
Special Materials

26. FORMING PROCESS
Material Preparation
Forming Process
Thermal Treatment
Methods of Thermal Treatment
Physical and Chemical Changes During Thermal Treatment

27. CERAMICS POTTERY

The Indian Industry
Raw Materials
Manufacture
Production and Trade

28. PROPERTIES AND APPLICATIONS
Composition and Microstructure
Chemical Properties of Ceramic Materia's
Optical Properties
Thermal Properties
Elastic Properties
Strength
Electrical and Magnetic Properties
Composites and Cermets
Uses of Ceramics

29. CERAMICS AS ELECTRICAL MATERIALS
Electrical Conduction Phenomena

Ionic Conduction in Ceramics
Electronic conduction in Ceramics
Nonstoichiometric and Solute-Controlled Electronic Ceramics.
Ceramics With High Electronic Conductivity or With Nonlinear Behaviour
Mixed Conduction in Ceramics

30. ANALYSIS OF CERAMICS
Abrasives
Cements, Lime, and Gypsum
Clay Products, Whitewares, and Porcelains
Enamels and Glazes
Glass and Glass Ceramics
Refractories
Newer Ceramics
Methods of Analysis
Determination of The Chemical Composition
Sampling
Sample Dissolution
Procedure
Analysis
Emission Spectroscopy
X-Ray Diffraction
Microscopy

31. PHOTOGRAPHS OF MACHINERY WITH SUPPLIERS CONTACT DETAILS

Get the full book

This sample shows only the contents and introduction. The full book has every chapter.
Price: Rs 1,495 | US$ 39.95
Delivery: Shipped within 5 working days of payment
Order online: niir.org/books/glass-ceramics-technology-book/ **WhatsApp:** +91 9097-075-054

Planning a unit? NPCS project reports:

- Sodium Silicate project report

NIIR PROJECT CONSULTANCY SERVICES (NPCS) is a reliable name in the industrial world for offering integrated technical consultancy services. NPCS is manned by engineers, planners, specialists, financial experts, economic analysts and design specialists with extensive experience in the related industries.

Our various services are: Detailed Project Report, Business Plan for Manufacturing Plant, Start-up Ideas, Business Ideas for Entrepreneurs, Market Research, Manufacturing Process, Machinery, Raw Materials, Project Feasibility, Investment Opportunities, Technical Consultancy and Startup Help.

NPCS also publishes process technology books, technical books, startup books, directory, business database, detailed project reports and market research reports.

Our Detailed Project Report aims at providing all the critical data required by entrepreneurs for starting new business ventures.



Scan to order the full book on niir.org