Glass Foam; Advantages, Applications and Production

M. Vijeh
Afrang Gostar Toban Company, Tehran, Iran
Email: mvijehco@yahoo.com

Abstract

Although glass foam is non-known product in Iran but it was produced in United State of America around 80 years ago. Already glass foam is use in wide range of construction and Industries in developed countries.
Glass foam has variety of advantages as; very good insulating material for heat, noise and humidity, high compressive resistance, light weight with low density, passive fire protection as incombustible product, no water absorption, dimension stability, chemical resistance with all chemical (except HF), easy work with simple tools like hand saw and finally ecological product because could produce by waste glass and could also reused as filler in thermal insulation material or as gravel in the road or roof.
Also with above wide range of advantages, it has also application in many of Industries, power plant and construction.
To produce glass foam, it should be start from waste glass and grind it to clear particle size. Then it should be add the foaming agent and mix it carefully. finally it should be transferred to big steel mould and put in the kiln tunnel and heat up to 850 centigrade degree with special heating carve. At the exit of kiln glass foam in big block will be ready. This big block will cut and saw in standard sizes and packed.
Total value of investment for 30000 cubic meters per year is around 11 to 12 million Euros.

Keywords: Glass Foam, Noise Insulate, Heat Insulate, Environment Friendly, Waste Glass, Resistance

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Effect of Silver Layer in Reflection Infrared Spectrum of Low-Emission Glass

N. Khodaivandi*, A. R. Ghorbani
Kaveh Float Glass Co, Research & Development Lab , Industrial City Kaveh, Tehran, Iran
Email: n-khodaivandi@kavehglass.com

Abstract

Low-e glass is a glass coated with a layer of Silver .This coating has been used for control of heat transfer of glass. Layer of Silver prevents of passing of Infra Red spectrum. This type of glass has a large transmission and reflection and low reflection of Infra Red spectrum. In this research, the effect of silver layer thickness on the reflection of Infra-red rays has been tested. The silver layers has been deposited on glass substrate by radio frequency (RF) sputtering. Deposition is done in an argon plasma atmosphere and by modification of silver layer thickness the effect of it on IR reflection has been measured. The silver layer by thicknesses between 10 to 25 Nano meter has been deposited and results has been measured by lambda950 spectrophotometer and emissivity meter. This research shows that by increasing the thickness of silver, some of Low-e glass properties has been improved such as U-Value and Solar Heat Coefficient Gain(SHCG). These two parameters improves performance of low-e glass in summer and winter and prevents heat loss in buildings.

Keywords: Low-E Glass, Silver Layer, Infra-Red rays, Sputtering, U-Value

Production and Properties of Non – Flouride Opal Glasses

M. Moinafshari
Liya Glass Company, Chazvin, Iran
Email: moinafshar@liyaglass.com

Abstract

In this article which is the outcome of a joint project between Science and Industry University of Iran and Shishe Va Gas co, an assessment on the laboratory scale production of four different groups of Non – fluoride opals is carried out.

In this project ten samples of calcium- phosphate opals with different chemical compositions, five samples of calcium – zinc - phosphate opals , twelve samples of spontaneous calcium – magnesium opals and fourteen samples of spontaneous calcium opals were produced in laboratory.

In all tests , the completely mixed batch was heated at 1450 °c in a high alumina refractory crucible for 2 hours. The molten glass produced was then poured into a small preheated steel mould (at 400 °c) with the dimensions 150×20×20 mm.

Finally all the glass samples were annealed at Tg + 5 °c for 30 minutes.

The problems facing the melting and fining of opal batches, and also the effect of chemical composition (specially with respect to alakali and alkali earth oxides) on the opacity of glass samples are considerered and discussed thoroughly. Physical and chemical properties of opal glass samples including dilatometric curves, opacity, bending strength, resistance to alkaline and acidic solutions were tested according to standard procedures, and the results are presented in the article, Based on these results, the optimum chemical composition for each group of opal glasses is advised.

Keywords: **Non-Fluoride Opals, Phosphate Opals, Spontaneous Calcium-Magnesium Opals, Opacity, Dilatometric Curves**

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Corrosion Process of Glass Furnace Refractories and Their Optimal Maintenance Methods

A. Emami, N. Fakhim Hashemi*
Hamadan Glass Company, Tehran, Iran
E-mail: research@hamadanglass.com

Abstract

Primary glass melting furnaces were made of mud and clay bricks and the most used fuel was wood. These furnaces changed and improved over time and their body was made of refractory bricks instead of mud and clay, and today, with the innovation of various refractory products, their lifetime has increased from a few months to 10-15 years. Glass melting furnaces are thermal chambers in which the glass melts using fuel combustion or electricity. In this paper, glass melting furnaces and their related issues are discussed with a practical and experimental approach so that it is useful for the glass industry.

First, main areas of a glass melting furnace are reviewed and adverse factors which may reduce the furnace lifetime are identified and introduced and different related assumptions are discussed and investigated. Also the suitable refractory selection methods for different areas of the melting furnace are discussed. Finally, a few points related to maintenance and repair of various areas of the furnace are stated.

Keywords: **Glass Industry, Glass Melting Furnace, Refractory, Regenerator, Maintenance**

Investigating the Disadvantages of Plastic Containers and to Compare them with Glass Containers

J. Shayegan*, M. Zabihi
Chemical & Petroleum Engineering Department, Sharif University of Technology, Tehran, Iran
Emai: Shayegan@sharif.edu

Abstract
Containers for packaging and storage of food represent one of the most popular uses of plastics and polymer additives. Due to low weight, high mechanical resistance, maintenance and easy transportation, the application of plastic bottles have increased. This paper investigates the effects of plastic bottles aspects of medical, environmental and energy consumption are discussed and compared with glass bottles. According to reported surveys, this is predicted that the growth of consumption plastics bottles will be 92000 ton in Iran in this year. Plastic bottles are not suitable for food storage because of their biodegradable property, recycling problem and their low quality after recycling. Releasing the hazardous substances in the air, especially during the manufacturing process, the emission of toxic compounds such as Antimony, Zinc, Bromide derivatives, and Phenol in water and food, are destructive effects on environment and human. Also, the usage of these containers is not cost effective because of their problems in recycling and the high cost to landfill the plastic bottle wastes. Versus, Glass bottles are made of minerals that can be recycled easily (15 -20 time) and have low cost recycling, so recycled glass bottles have a quality like the original bottles and less energy to primary energy production are needed. Therefore, glass bottles may be safe to store food.

Keywords: Plastic, Glass, PET, Environment, Dioxin

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Theory, Technology & Microstructure of Glass Ceramics "A powerfull Potential for New Products"

A. Nemati
Materials Science & Engineering Department, Sharif University of Technology, Tehran, Iran
Email: nemati@sharif.edu

Abstract
Glass-ceramics are so called heat treated glass(s) to produce a miture of glassy and crystillne phases. These types of ceramics are generally produced via melting process and a controlled nucleation and growth. The nature of glassy phase, the type and amount of crystalline phases and their distribution are important parameter to control the final properties.
The main goal this paper was to have a general review of glass ceramics as a big potential to produce new ceramics and their applications. Then, a few case studies are discussed, which were glaas ceramics as a bio materiasl and machinable and transparent glass ceramics. In this regards, the following equipment are applied; XRD; SEM; STA and spectroscopy.

Keywords: Glass Ceramics; Bio Ceramics, Transparency; Additives; XRD; SEM; STA and Spectroscopy

The Effects of Additives on the Transparency of Mica Glass-Ceramics

A. Nemati[1*], M. Ghasemzadeh[2], A. Nozad Golikand[3], S. Baghshahi[4], Z. Hamnabard[3]

1- Materials Science Engineering Department, Sharif University of Technology, Tehran, Iran

2- Materials Engineering Department, Karaj Branch, Islamic Azad University, Karaj, Iran

3- Ceramic Group, Material Research School, Karaj, Iran

4- Engineering Faculty, Imam Khomeini International University, Qazvin, Iran

E-mail: nemati@sharif.edu

Abstract

The change in the transparency of mica glass-ceramic in the system MgO- SiO_2-Al_2O_3-K_2O-B_2O_3-F with and without additions has been investigated. The applied additives were LiF, NaF and CaF_2. Crystallization of glass-sample was done by controlled thermal heat-treatment, at nucleation and crystallization temperatures.

The results showed that the glass-ceramic can remain transparent if fine grains with nano size are precipitated, but will turn opaque when large grains appear because of the difference in the refractive index between glass and precipitated crystals.

The comparison of the additives indicated that LiF had a pronounced effects than CaF_2 on the crystallization temperature as well as precipitated phase.

Keywords: Glass Ceramics; Transparency; Microstructure-Final; Optical Properties