Integral Research (Peer-reviewed, Open Access & Indexed Multidisciplinary Journal)
Journal home page: https://integralresearch.in/ ISSN: **3048-5991**, Vol. 01, Issue-01, March.2024

Chemical Analysis & Workers Health in Glass Industry of Firozabad

Dr. Satya Narayan Singh*
Radha Govind University
Ramgarh, Jharkhand

Abstract:
In present era, the use of glass has become positively in the modern era, and its application continues to expand day by day. Due to that, the glass industry capture a position of large & boundless significance in its own right; however, it poses equally substantial risks to humanity. We know that heavy chemical uses in glass industry due to date risk of labour and human kind in glass industry is to high and those days it is very dangerous with environment pollution and other pollution in the other hand we have behave Limited employment option and economical concern is also present there so. First be know that glass Industries have a heavy requirement of human labour and the various chemical employed or expert in this field such as oxide bromine and various colouring agent these are the main chemical which used in glass industries. Beyond the heavy Risk to labour the glass industry also inflict damage upon our environment the glass industry is contribute to increase of greenhouse gases in our environment due to high energy composition the industries generate more accessible pollution or emission like CO_2 SO_2 and No_X dear bye gravity global warming on the other hand the sustainable energy composition involved poses risk to the labour engaged in this glass industry. Silica various stabilizers, Special Additives as Borosilicate, Boric Acid, Borax, and many more refining agents also harmful for labour in glass industries. Glass industry have also very heavy risk of physical injury to do those handling their job. So physical hazardous, chemical hazards and economic and noise hazard are main harmful problem of Glass industry in present time. We have to solve these problem for better and safe future of their workers and also enhancement of glass industry.
Keywords: *Silica gel, boundless, local workforce, enamel-painted glass-based products, bangles, Provide stability, Glassmaking Industry*.

Chemistry in Glass Industry

All the glass industry including Firozabad glass industry need very high temperature to transform silica into an atheistic solid; generally this typically involves the use of soda ash to lower the melting point and

* Corresponding Author: Dr. Satya Narayan Singh
E-mail: snyadav9837@gmail.com
Received 17 Jan. 2024; Accepted 21 March 2024. Available online: 30 March 2024.
Published by SAFE. (Society for Academic Facilitation and Extension)

limestone to provide substantiality. In this industry many Chemical additives also modify its properties like as boron oxide (use for enhances heat resistance) while metal oxides impart color and increase its fastness.

Key Chemical Components Used in the Glass Industry

At present time the glass industry are use many types of chemical. Some of them are as follows:

1. Silica : Silica is most important chemical which uses in glass industry in those days. This chemical compound constitutes serves as a structural material primarily utilized within this industry. This chemical element derived from high-quality sand. High-quality silica is found primarily in India. Rajasthan, Gujarat, Andhra Pradesh, Tamil Nadu, MP & the Chhattisgarh are main producing area in our India . Specially Rajasthan is the key producer for silica India.

The silicate oxide is the chemical name silica. It is main composed of silicon oxide & and oxygen. Communally Silica is used in the glassmaking industry in large level. A high-quality varieties of silica are found in plenty. In glass industry Silicon is predominantly utilized as a primary material.

An other substance of it, Silica gel is more specific form of silicon oxide. Due to its unique chemical structure and high surface area, silicon oxide readily absorbs moisture. The property of silicon oxide makes an extremely useful substance. In present glass industry Silica gel is primarily used in the manufacturing of pharmaceutical specifically glass bottles, where these bottle serves to keep the enclosed tablets safe and dry for a long period. No doubt, silica gel is harmful to mankind skin; however, prolonged period is believed to cause skin redness, itching and irritation. Generally the substance of silica, silica gel acts as a visual indicator, appearing in colors such as orange and blue also. In simple words these types of chemical changes or indicators change color are the evidence of residual moisture present within the silica gel. This substance containing these chemical indicators is not typically used to preserve the moisture-sensitive properties of medicines or food products; instead, Silica gel is communally employed to keep electronic devices dry.

2. Soda Ash: Soda as is the other prominent chemical, which use in glass industry in present days. Soda ash component lowers the melting point of the sand from an extremely or very high temperature to a suitable temperature level—typically ranging from approximately 700°C to 1100°C. In our country it is also known as sodium carbonate, which is a highly significant chemical component in this industry . Soda ash is primarily utilized in the manufacturing of glass products and also use in detergent industry for a very large scale in present time.

3. Stabilizer*s*: The stabilizers are more vital chemical elements extensively employed in the glass industry of Firozabad. Mostly stabilizers are added to render the glass insoluble in water and chemically durable.

4. Special Additives (Borosilicate, Boric Acid, Borax): This type of additives provide a important resistance to thermal shock in glass industries commonly in glass additives refer to substance in corporate into main raw material during the glass manufacturing process to making a beautiful saved glass ware or bangles Generally, additives serve specific functions, lick as facilitating the melting of glass or enabling it to be molded into a particular shape or many other shapes.

5. Coloring Agents (Colorants): Coloring agent are very essential in glass industry, without it glass industry can not run smoothly. This type of colouring agents Cobalt oxide, Cobalt Oxide (to produce blue hues), Chromite Oxide (for green hues), and Nickel Oxide (for brown hues)—used to introduce specific colors into the glass. Some of them are as :

- Chromium > Green.
- Cobalt > Blue.
- Nickel > Violet/Brown.
- Selenium metal > Red.

Colour Sources

- Ionic (charge transfer, ligand field)
- Metal Colloids (Au, Ag, Cu, As, Sb, Pb, others)
- Semiconductor Particles (primarily Cd based)
- Insulator Particles (opal glasses) • Defects (radiation, solarization)

6. Refining Agents: Refining process is the key process in each & every glass industry in present time. Here Numerous chemical agents are utilized in this industry; for instance, Arsenic Oxide or Sodium Nitrate are employed during the melting process to eliminate bubbles.

7.Sodium Sulfate : In this industry sodium Sulfate is the most commonly used refining agent. This may be harmful for workers specially particularly in excessive quantities—results in the emission of sulfur dioxide, which contributes to acid rain and can subsequently lead to lung diseases in labour of industry.

8. Nitrates: In present time employed in the glass industry primarily as oxidizing agents, functioning in conjunction with sulfur. No doubt, the excessive use of this chemical can prove harmful.

9. Barium Sulfate : It is also a vital chemical in glass industry. Its Uses in glass manufacturing processes involving high temperatures, Barium Sulfate emits gases upon thermal decomposition. We have to know that These emissions cause environmental damage and simultaneously pose health risks to the workers.

10. Arsenic Oxide : Currently, the use of arsenic oxide in the glass industry has significantly declined. This is because it acts as it's a highly potent refining agent while simultaneously being a toxic and carcinogenic substance. Due to these hazardous properties or dangerous, The more usage is being progressively phased out in modern glass manufacturing.

Conclusion

So it is clear that in present glass industry is more growing industry in our India specially Firozabad glass Industry. But we also have to know that, there are many harmful aspects in this industry as for : Physical Hazards, Chemical Hazards, Burns, Ergonomic and Health Risks, Eye Injuries, Operational & Product Hazards, Hot End (Melting/Forming) Cold End (Cutting/Packing) Heat Stress & Silica Dust Inhalation etc.

References

1. Kanti, Tushar, and Deepak Singh. "A Study of Firozabad Bangle Industry.

2. Khan, Ishan, and V. M. Ravi Kumar3. Prakash, Ram. *The Glass Bangle Industry of Firozabad: A Report on Child Labour*. New Delhi: National Labour Institute, 1989.

3. Sethi, Girish. *Towards Cleaner Technologies: A Process Story in the Firozabad Glass Industry Cluster*. New Delhi: TERI Press, 2008.

4. Chandra, Anjuli**.** "Child Labor: A Study from Anthropological Perspective with Special Reference to Glass Industry, Firozabad.

5. Jain, Akshita, and Kriteeka Sharma. "History of Traditional Town of Bangle Makers: Firozabad, Uttar Pradesh

6. Kaba, Arnaud. "Of Glass, Skills and Life: Trade Consciousness among Firozabad's Glass Workers." *Third World Quarterly* 45, no. 4 (2024): 771–789.

7. M. Sakono, T. Maruyama, N. Kamiya and M. Goto: Biochem. Eng. J. **19** (2004) 217–220.

8. N. Kamisugi, N. Kuzuu, Y. Ihara and T. Nakamura: Laser Eng. **26** (1998) 182–185.

9. H. Hosone: OYO BUTURI 69 (2000) 0415–0419.

10. Japanese Patent 64-79035.

11. S. Sakka: Glass Handbook, (ASAKURA SYOTEN, 1975) p. 158–162.

12. S. Sakka: Glass Handbook, (ASAKURA SYOTEN, 1975) p. 296.

13. S. Sakka: Glass Handbook, (ASAKURA SYOTEN, 1975) p. 836–837.

14. K. Fujita and Y. Takahara: J. Jpn. Inst. Metals, *in print.*

15. N. Y. Voo, J. K. Sahu, M. R. Mokhtar, D. N. Payne and M. Ibsen: POWAG 2004 Bath 12–16 July 2004.

16. S. Parke and R. S. Webb: J. Phys., 1971, Vol. 4 825–828.

17. H. Sakai, J. Jin and T. Yoko: NEW GLASS **11** (1996) 27–34.