International Journal of Advanced Science, Engineering and Technology.
ISSN 2319-5924
Vol 2, Issue 2, 2013, pp 120-124
http://www.bipublication.com

A STEP FORWARD TOWARDS GREEN REVOLUTION IN CONCRETE TECHNOLOGY :(A REVIEW)

D.B. Desai[1], A.K. Gupta[1] and Pradeep Kumar[2]

[1]Dr. J. J. Magdum College of Engineering, Jaysingpur[1]
[2]Harcourt Butler Technological Institute, Kanpur[2]

[Received-18/12/2012, Published-02/02/2013]

ABSTRACT:

In present paper reviewed the present status of concrete technology, mechanism and the possible next-Generation technology i.e. Green Concrete. Green concrete having the outstanding performance like high compressive strength, durability, resistance to firei-acid-alkali and cheapest. The industries which are using the Cement concrete and polluting the environment should aware to use Green Concrete technology and truly state the India again in Green Revolution.

Keywords: concrete technology, green concrete, durability, green revolution.

INTRODUCTION:

The Green Revolution, in India was on track from1967 to 1978, which changed the condition of India. Indian people's condition was, as to say like a food-deficient country and because of the Green revolution in farming the India became world's leading agricultural continental. The main cause of instant and severe action to amplify the crop products, this is known as the Green Revolution that is useful to develop the countries status.

Like this statement above, now the current Era is in track to develop as a Green Revolution in concrete technology, to reduce the energy consumption, pollution and a better future for the next-Generation as a Eco-friendly live-hood on the Earth.

Concrete is a strong, durable and economic construction material with different engineering applications. The principal components of concrete are coarse and fine aggregates, water, Portland cement and other bindings, and chemical additives, which, with a proper mix design and construction procedure, produce the concrete with the required engineering properties [1].

Durable concrete will maintain its unique form, superiority, and serviceability when uncovered to its surroundings. One of the immerging concrete technologies for sustainable development is to use "green" materials for construction. The "green" materials are considered as materials that use less natural resource and energy and generate less CO2. They are durable and recyclable and require less maintenance [2].

The distinctiveness growth includes environmental sustainable development and its impacts on the surroundings. The development of an invention should not lead to the obliteration of the environment. Concrete produced in vast amount on that basis the ecological force are reasonably significant, in production of ample amount of cement and concrete. Concrete is the subsequent consumed unit after water it measures upto 5% of the world‘s total CO2 emission [3]. The solution to this environmental problem is not to substitute concrete for other materials but to reduce the environmental impact of concrete and cement. Quarry rock dust along with fly ash and micro silica and reported satisfactory properties [4]

The possible ecological advantage to civilization of being able to construct with green concrete is enormous. It is reasonable to take for granted that technology can be developed, which can divide the CO2 emission. bulky consumption of concrete will potentially decrease the world‘s total CO2 emission by 1.5-2%, also be the key to solve the ecological problems. We can also use residual yield from other industries in the concrete production. In the last few decades the social order has become conscious regarding the residual products and it’s benefits.

Geopolymer Concrete

Remarkable innovation in concrete is the Geopolymers, can be united with materials like slag, pfa, and pozzolanas, for production of concrete.

The product is durable and strong. Geosynthesis that is a reaction which chemically integrates minerals, linking naturally occurring silico-aluminates, this silicon and aluminium atoms react to form unit which can built a natural rock.

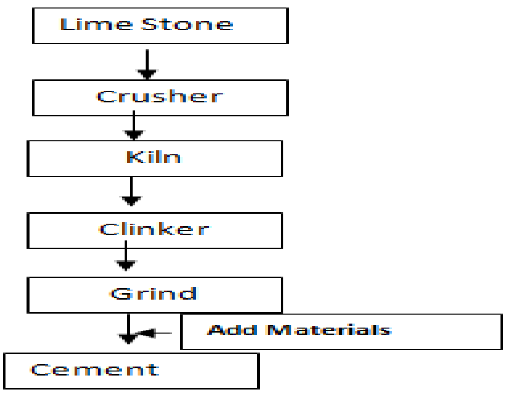

Figure 1 process of cement making.

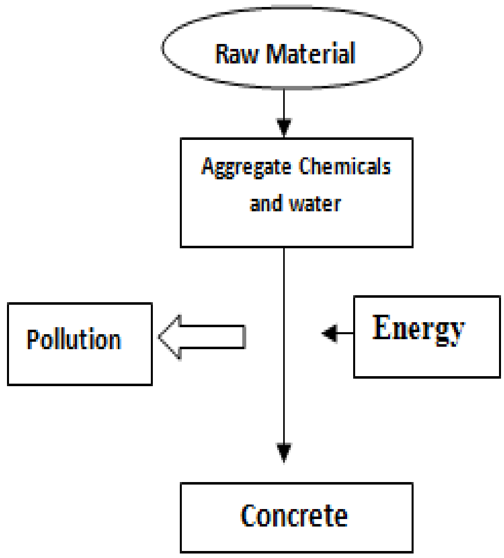

Fig. 2: Resource consumption flow and emissions in concrete industry.

Table 1: Amount of heat input by kiln type

Kiln type	**Heat input** (million btu/ton of cement)
Wet	**5.5**
Long dry	**4.1**
Preheater	**3.5**
Preheater/ precalciner	**3.1**

Source: EPA, 2007 [18]

Two major challenges

World demand/year

11.5 billion tons of concrete

2 billion tons of cement

1 billion tons of water

9 billion tons of aggregate

Challenge II: Long-term durability

In recent advances the nanotechnology is also act as a key role to form a built up a concrete.

Nanotechnology to improve materials of green concrete using recycled water making of green cement by developing superior geopolymers characterization of the deterioration reactions of concrete exposed to desert conditions.

Concrete is an environmental friendly material and the overall impact on the environment per ton of concrete is limited. Extreme weather patterns are occurring with greater frequency in many parts of the world. This occurrence is associated with the high emission rates of green-house gases, primarily carbon dioxide, the environmental concentrations of which has improved from 280 to 370 parts per million volume mainly during the industrial age [5, 6].

PERFORMANCE PROPERTIES:

It is clear that materials exhibiting the following performance properties can be made with both technological and commercial confidence:

- high compressive strength gain [7]
- good abrasion resistance, particularly when mixed with PTFE filler [8]
- rapid controllable setting and hardening [7]
- fire resistance (up to 1000 °C) and no emission of toxic fumes when heated — either in the form of a carbon fibre/geopolymer composite [9] or as a pure geopolymer (e.g. a geopolymeric coating on an exposed surface) [10]
- high level of resistance to a range of different acids and salt solutions [11]
- not subject to deleterious alkali–aggregate reactions [12]
- low shrinkage and low thermal conductivity [13]
- adhesion to fresh and old concrete substrates, steel, glass, ceramics [14]
- high surface definition that replicates mould patterns [10]
- inherent protection of steel reinforcing due to high residual pH and low chloride diffusion rates [15,16].

Innovative Research

To develop structural must concentrate on the durability, flexural and shear behavior of concrete produced with RCA (green concrete) as a structural material were carried out. The research was carried out in stages including: (1) the material characterization of two sources of RCA obtained from different geographical locations of Canada and showing significantly different properties; (2) the preliminary study investigating the fresh and hardened properties of concrete produced with these two types of RCA; (3) the development of mix design procedures for green concrete based on the results obtained from the preliminary study; (4) the investigation of the durability properties (5) Investigation of the flexural and shear behavior. The following is the summary of the experimental program carried out in this research [17].

Materals required for the production of green concrete;

Fly ash, Alkaline Liquid, water, sand Aggregates, Super plasticizer. Sand is small aggregates in geopolymer mortar. Use a Super plasticizer was in most of the mixtures.

Deterioration Studies

The service life of a structure is determined largely by its durability properties and existing environmental conditions. Every structure is to be designed for dead, live and special loads so that its load-carrying capacity is not exceeded. Poor condition of numerous existing offshore and under-water structures points out to a requirement for developing a design procedure that will consider environmental and durability conditions. Environmental loads can be included in the existing design procedures and thus have an effect on the material and geometrical properties to insure an adequate service-life of the structure. Under these conditions, predicting the service life of concrete structures became an important subject in making the most cost-effective decisions concerning future management of these structures.

Resistance to corrosion

Since no limestone is used as a material, geopolymer cement has outstanding properties in acid and salt environments. It is particularly fitting for harsh environmental circumstances. Sea water can be used for the blending of the geopolymer cement. This can be useful in marine environments and on islands short of fresh water. (It is impossible to make Portland cement with sea water).

CONCLUSION:

By studying the all circumstances regarding the Green concrete has the durability, sustain capability and nature to support the environment by acting Eco-friendly.

Many of the industries which are using the Cement concrete and polluting the environment should aware to use Green Concrete technology and truly state the India again in Green Revolution.

REFERENCES:

1. Jorge A. Tito and Alberto Gomez-Rivas(2012), Teaching Green Concrete, Tenth LACCEI Latin American and Caribbean Conference (LACCEI'2012), Megaprojects: Building Infrastructure by fostering engineering collaboration, efficient and effective integration and innovative planning, July 23-27, 2012, Panama City, Panama.
2. * 3. Edvardsen, C., and K. Tollose. "Environmentally 'Green' Concrete Structures." Proceedings of the FIB Symposium: Concrete and Environment, Berlin, October 2001.
3. ErnstWorrell, Lynn Price, Nathan Martin,Chris Hendriks, and Leticia Ozawa Meida, (2001)CARBON DIOXIDE EMISSIONS FROM THE GLOBAL CEMENT INDUSTRY, Annu. Rev. Energy Environ, 26:303–29
4. Pravin Kumar, Kaushik S.K. 2005. SCC with crusher sludge, fly ash and micro silica. The Indian Concrete Journal. 79(8): 32-37, August.
5. Dunn, S. "Decarbonizing the Energy Economy," State of the World 2001: A World watch Institute Report on Progress Toward a Sustainable Society. W.W. Norton and Company, 2001, pp. 83-102.
6. Mehta, P.K. "Concrete Technology for Sustainable Development." Concrete International 21(11), 1999, pp. 47-52.
7. W.K.W. Lee, J.S.J. van Deventer, The effect of ionic contaminants on the early-age properties of alkali-activated fly ash-based cements, Cem. Concr. Res. 32 (4) (2002) 577–584.
8. H. Wang, H. Li, F. Yan, Reduction in wear of metakaolinite-based geopolymer composite through filling of PTFE, Wear 258 (10) (2005)1562–1566.
9. R.E. Lyon, P.N. Balaguru, A. Foden, U. Sorathia, J. Davidovits, M. Davidovics, Fire-resistant aluminosilicate composites, Fire Mater. 21 (2) (1997) 67–73.
10. J. Davidovits, Geopolymers — inorganic polymeric new materials, J. Therm. Anal. 37 (8) (1991) 1633–1656.
11. A. Palomo,M.T. Blanco-Varela,M.L. Granizo, F. Puertas, T. Vazquez,M.W. Grutzeck, Chemical stability of cementitious materials based on metakaolin, Cem. Concr. Res. 29 (7) (1999) 997–1004.
12. I. García-Lodeiro, A. Palomo, A. Fernández-Jiménez, Alkali–aggregate reaction in activated fly ash systems, Cem. Concr. Res. 37 (2) (2007) 175–183.
13. P. Duxson, G.C. Lukey, J.S.J. van Deventer, Thermal conductivity of metakaolin geopolymers used as a first approximation for determining gel interconnectivity, Ind. Eng. Chem. Res. 45 (23) (2006) 7781–7788.
14. J.L. Bell, M. Gordon, W.M. Kriven, Use of geopolymeric cements as a refractory adhesive for metal and ceramic joins, Ceram. Eng. Sci. Proc. 26 (3) (2005) 407–413.

15. J.M. Miranda, A. Fernández-Jiménez, J.A. González, A. Palomo, Corrosion resistance in activated fly ash mortars, Cem. Concr. Res. 35 (6) (2005) 1210–1217.
16. Y. Muntingh, Durability and Diffusive Behaviour Evaluation of Geopolymeric Material, M.Sc. Thesis, University of Stellenbosch, South Africa, 2006.
17. http://www.21techmag.com/index.php?option=com_content&view=article&id=31&Itemid=37
18. http://epa.gov/ncea/