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PART 1:

Journal Name:	British Journal of Applied Science & Technology
Manuscript Number:	**MS: 2013_BJAST_3036**
Title of the Manuscript:	**Incidence of the randomness of the most influential parameters on the reinforced concrete carbonation time**

General guideline for Peer Review process is available in this link:
(http://www.sciencedomain.org/page.php?id=sdi-general-editorial-policy#Peer-Review-Guideline)

- This form has total 9 parts. Kindly note that you should use all the parts of this review form.

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PART 2: Review Comments

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Compulsory REVISION comments	This paper mainly deals with the evaluation of carbonation time, which is the time necessary so that the face of carbonation arrives until the reinforcement from a probabilistic analysis. Monte Carlo simulations are realized under the assumption that the Water /Cement ratio, the relative humidity, and the pressure of the carbonic gas on the surface of the concrete are random variables with a log-normal probability distribution. In this paper, the authors have applied probabilistic formulation to carbonation phenomenon, and statistics regarding carbonation time are investigated by performing a parametric analysis which integrates the influence of variation coefficient of relative humidity, water to cement ratio and carbonic gas pressure As all concrete technologists know, the	Thank you for your useful comments and suggestions on the structure of our manuscript. We have modified the manuscript accordingly, and detailed corrections are listed below point by point: **1)** The first conclusion It is not the only w/c ratio. Indeed it depends on the type of cement plus supplementary cementing material as discussed above. What happens when the concrete contains certain percentage of fly ash or slag or combination of such materials for the time of carbonation? Clarify this. <u>Clarification</u> Mineral additives such as slag fly ash, changes the nature and texture of the concrete hydrates. One of their biggest impacts is to reduce the amount of portlandite in hydrates. This reduction

	Carbonation mechanism of cement-based materials is affected by a several parameters relating to the material properties and its surrounding environment. In particular, carbonation is governed by the diffusivity of CO_2 within concrete and chemical reactions between CO_2 and carbon table products. Two main phenomena affect the carbonation process: cement hydration and drying. Hydration is the main source of carbon table products such as Portlandite and it governs the formation of pore structure, and thus the gas diffusivity. Drying affects both cement hydration and water saturation degree, and thus gas diffusivity and the aqueous chemical reactions of carbonation. To understand the carbonation process what is important is to study the properties involved in carbonation mechanisms namely hydration kinetics, porosity, Portlandite content and water vapor desorption isotherm. The effect of curing conditions is also important. It also depends on the presence of supplementary cementing materials which will reduce the porosity of the concrete. At any w/c or w/cm ratio, the	is accompanied by an improvement in the pores and capillaries, a decrease of permeability and a reduction in CO_2 diffusivity in concrete, which can lead, in it self, a gain of sustainability. 2)The second conclusion From this it is clear that the carbonation process depends on the severity of the exposure condition. Is it that if the exposure is mild or moderate, one should not worry much about coronation irrespective of the w/c ratio and the mix proportion? Clarify this <u>Clarification</u> The W / C ratio is an important criterion in concrete formulation; it is an essential parameter of the workability and mechanical resistance to compression and durability. The cement depends on several factors such as the type of concrete, the purpose of the structure, the required strength, environmental actions which the concrete is subjected.

	porosity depends on the type of SEMs, its fineness and the formation of quality gel. Thus in order to study this phenomenon completely a thorough accelerated carbonation test is required. Considering the above facts on carbonation, the simulation study by the authors is quite encouraging. Even the authors have not come out with any concrete conclusions. The reviewer seeks the following clarifications: 1. The first conclusion *Statistics values of the carbonation time are independent of the W/C coefficient of variation. Indeed, this parameter has an important influence on the interconnection of the porous network, and consequently on the permeability of the concrete and the diffusivity of CO_2 within it.* **It is not the only w/c ratio. Indeed it depends on the type of cement plus supplementary cementing material as discussed above.**	The cement dosage has a direct influence on the mechanical strength of concrete. The resistance is substantially proportional to the cement. We have modified the manuscript accordingly, and detailed corrections are listed below point by point: - Fig 1 was modified following your recommendations - CH : quantity of Portland cement. -Under clause 3 =0.5 varies between 0 and 0.5. -The figures 4 to 6 are modified -Other references are added from international journals

	What happens when the concrete contains certain percentage of fly ash or slag or combination of such materials for the time of carbonation? Clarify this. 2. The second conclusion *Variability of the water to cement ratio and the relative humidity influences slightly the carbonation time, whereas the Carbonic gas concentration heterogeneity controls the speed of carbonation by causing a delay in the carbonation process,* **From this it is clear that the carbonation process depends on the severity of the exposure condition. Is it that if the exposure is mild or moderate, one should not worry much about coronation irrespective of the w/c ratio and the mix proportion? Clarify this**	

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Minor REVISION comments	**1. Fig 1 appears to be downloaded from the internet. Give the reference for this sketch or develop your own sketch. O2, H2O, arrow is not clear.** **2. Under clause 2.1, below the equation (3), what is CH?. Is should be quantity of Portland cement.** **3. Under clause 3, put the lower limit as zero for the following sentence.** =0.5 varies between ----? and 0.5.	
Optional/General comments	1. In figures 4 to 6, the legends inside the figure and vertical axes title are not readable. Modify these figures. 2. Give few more references related to carbonation from international journals and discuss under literature review.	