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The Investigation of Different Curing Regimes on Reactive Powder Concrete Strength: A Review

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ABSTRACT

Enhancing the properties of reactive powder concrete (RPC) by developing the internal structure or making replacements or additions to the aggregates is becoming a prevalent method to obtain RPC with desired properties, which it can be used in numerous applications in the construction industry. Pozzolanic active constituents are used in large quantities to reach the desired properties, but on the other hand, these methods are still not sustainable and could be expensive. This study explores methods of curing RPC that affect compressive strength and other mechanical properties. This study briefly describes how RPC's internal structure and mechanical properties are enhanced. The core objective of this study is to review the methods for curing RPC such as normal, hot water, steam, hot air, and autoclave curing. Curing methods significantly impact the strength of concrete. High-temperature methods, especially autoclave curing, accelerate hydration and produce superior concrete properties.

Keywords: Reactive powder concrete, Curing, Autoclave curing, Steam curing, Ultra-High-Performance concrete.

1. INTRODUCTION

Concrete is classified into many groups according to its strength and toughness. High-strength concrete can withstand high loads, and hence it could be used to build high rise buildings **(Tantawi, 2015; Hiremath and Yaragal, 2017).** Ultra-high-performance (UHPC) concrete is repeatedly used in buildings and bridges **(Chen et al., 2019; Elmorsy and Hassan, 2021).** Reactive powder concrete (RPC) was invented to meet the increased demand for high-performance concrete. It was made using techniques of enhancing the internal structure. Cheyrezy and Richard, in 1990 and 1995, respectively started the research for making RPC **(Wang et al., 2012; Kadhum, 2015).** The most famous type of UHPC is RPC, and the minimum required strength is 120 MPa **(ASTM C1856/C1856M, 2019; Rohden et al., 2020).**

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(Mayhoub et al., 2021) mentioned that the RPC is a special type of UHPC and (**Silvia et al., 2003)** stated that fibers often reinforce RPC. RPC also has better properties due to using fine particles instead of aggregates **(Shaheen and Shrive, 2006; Abbas et al., 2023)**. Steel fibers are the most used in this kind of concrete **(Zdeb and Jacek, 2009; Tong, 2020)**. In addition to the mentioned characteristics, superplasticizers are used to lower the water/cement ratio until reaching 0.2 **(Marios et al., 2003; Al-Hassani et al., 2014)**. An important issue is enhancing particle packing in this kind of concrete to have a dense material, which gives the RPC its dense microstructure and, hence, its well-known properties **(Sanjuán and Andrade, 2021).**
RPC is a composite material that is based on cement. RPC typically comprises of cementitious materials and finely ground powders such as silica fume (S.F). and quartz powder. Furthermore, fibers play a crucial role as a necessary component in reactive powder concrete (RPC) to improve its ductility **(Sarika and John, 2015; Hiremath and Yaragal, 2017)**. RPC, like all concrete, is indeed brittle in tension and prone to cracking. Fiber reinforcement is commonly used to mitigate this weakness. The use of steel or other fibers enhances RPC's tensile strength and ductility, preventing sudden failure and improving crack control. Fibers bond with the surrounding concrete matrix, transferring stress and bridging cracks, thus delaying failure and increasing the overall toughness of the material **(Xu et al., 2016; Muhsin and Fawzi, 2021)**. The latter connects the two fracture surfaces, and the bond mechanism distributes their stress into the concrete **(Al-Quraishi et al., 2018)**.
Distorted fibers such as twisted, corrugated, or hooked can further increase the mechanical strength of composite materials. As stated by many researchers, the fiber matrix binding strength of shaped steel fibers is 3-7 times that of straight fibers. The degree to which mechanical qualities are improved depends on several variables, including fiber length, form, and curing conditions **(Mohammed et al., 2020; Hussein et al., 2022). (Wang et al., 2023)** concluded that straight steel fibers were the least effective in preventing fractures and could be readily taken out. Wavy steel fiber connections provided the best energy dissipation capacity but the lowest primary stiffness and shear capacity. **(Al-Jubory, 2013; Danha et al., 2013)** have studied the compressive strength of RPC reinforced with fiber. Results revealed higher compressive strength than that of non-fiber reinforced RPC, making it appropriate for structural components requiring high primary compressive strength.
This kind of concrete is related to the UHPC group. (RPC) is a type of cementitious composite material that was initially technologically advanced by the technical division of Bouygues, S.A., in the early stages of its development. The material exhibits exceptional physical properties, notably strength and ductility **(Mohammed and Ali, 2023)**. The outstanding mechanical properties of RPC, precisely its compressive strength, render highly attractive to professionals in the construction industry. RPC is a recently developed type of high-performance concrete with exceptional strength and durability. The primary characteristics of this material comprise a substantial proportion of cement, a little ratio of water-to-binder (consisting of cement and silica fume), a significant quantity of superplasticizer, and finely crushed quartz and silica fume. The fine quartz sand has been utilized as a complete substitute for the coarse aggregate. RPC exhibits compressive strength ranging from 150 to 800 MPa, whereas its tensile strength varies from 25 to 150 MPa **(Alkhaly and Hasan, 2022)**. Additionally, the specific gravity range of Reactive Powder Concrete (RPC) is typically between 2.4 and 2.8 metric tons per cubic meter. To enhance the homogeneity of this concrete, particles such as crushed quartz with a size range of 100-600 μm are utilized

as an addition in place of coarse aggregate. The incorporation of silica fume into reactive powder concrete (RPC) results in a reduction of the overall pore volume of the cement paste and a decrease in the mean diameter of the pores. In addition, it has been observed that subjecting freshly prepared reactive powder concrete (RPC) to pressure during the setting phase for 6-12 hours can mitigate the formation of pores. The micro-cracks present in newly cast Reactive Powder Concrete (RPC) are mitigated upon release of the applied pressure **(Rahmatabadi, 2015).**

In conceptual terms, a water-to-cement ratio of 0.42 and higher is required for complete cement hydration. Nonetheless, total hydration is very hard to attain in reality. According to research, cement reaction nearly ceases when the relative humidity inside capillary pores falls below 75-80%. Furthermore, raising the w/c ratio causes more water to evaporate, reducing the relative humidity inside the capillary pores. In conclusion, when using the adequate curing method, the overall moisture in the pores of the concrete could be up to 80%, which will encourage the hydration of cement, eventually making an enhanced internal structure **(Gereziher Atsbha and Zhutovsky, 2022).** Curing methods significantly affect concrete strength, and many research articles have revealed this fact **(Taylor, 2014; Khreef and Abbas, 2021)**. Steam, autoclave and coating curing all can alter the properties of RPC towards higher properties by affecting the hydration process, which also enhances the bonding between the constituents (**Memon et al., 2018; Raza and Qureshi, 2021; Raza et al., 2021).**

One of the drawbacks of RPC is that it is used in limited applications due to its higher cost, but it is still increasingly used worldwide, especially in Europe. RPC is utilized in limited regions owing to its comparatively elevated production expenses. One of the studies under consideration examines the fabrication of cementitious composites with exceptional strength properties, achieving compressive strengths of up to 350 MPa. To achieve an ideal blend with a precise dispersion of all granules during the setting process, it is recommended to utilize a low water-to-cement ratio for the concrete, optimize the use of high-fineness silica fume, ensure a homogeneous spreading of the mixture, and incorporate short steel wire to enhance the ductility and strength of the concrete. The study proposes that compressive force be applied during the placement of the mixture into moulds, followed by the submission of pressure steam during the curing process **(Canbaz, 2014)**.

The word "concrete" is utilized instead of "mortar" to denote Ultra-High-Performance Concrete (UHPC) owing to the incorporation of fine steel fibers that augment its ductility. RPC can be formulated in the absence of fibers. Internal structure enhancement techniques have been employed in the advancement of Reactive Powder Concrete (RPC) by modifying its properties, including but not limited to enhanced durability, heightened compressive strength, and exceptional toughness. The standards above have been achieved via the subsequent principles **(Mayhoub et al., 2021)**. Additionally, researchers have reported that implementing various heat curing procedures significantly enhances the mechanical characteristics of Reactive Powder Concrete (RPC) after adding an initial pressure of 50 MPa to the freshly mixed material. The submission of pressure to fresh reactive powder concrete (RPC) during its setting phase for 6-12 hours has the potential to mitigate the formation of pores that arise due to shrinkage. The micro-cracks present in newly cast Reactive Powder Concrete (RPC) are mitigated upon release of the applied pressure **(Rahmatabadi, 2015).**

Another study was conducted on RPC and tested for bending and compressive strength. The ultimate strength was between 170 and 200 MPa and a temperature between 250 to 400 C°. The increased strength was due to using silica fume and the w/c ratio. This research discusses the effects of different curing types on reactive powder concrete (RPC). It provides the reader with background information on the importance of curing and the specific benefits of high-temperature methods like autoclave curing.

2. EFFECT OF DIFFERENT TYPES OF CURING ON THE PROPERTIES OF REACTIVE POWDER CONCRETE

2.1 Normal Curing

According to the American Concrete Institute (ACI), Normal curing in concrete refers to the process of maintaining adequate moisture and temperature conditions in freshly placed concrete to ensure proper hydration of cement and achieve desired strength and durability. **(Jassim et al., 2015)** investigated the influence of curing conditions on the properties of RPC. They found that while ambient curing (normal curing) is a simple and cost-effective method, it results in slower strength development compared to accelerated curing methods. RPC cured under ambient conditions requires longer durations to achieve the desired properties. This makes it suitable for applications where early strength gain is not critical. In another study, Properties of Reactive Powder Concrete Using Local Materials and Various Curing Conditions, researchers produced RPC with local materials and achieved a compressive strength of 121 MPa at 28 days using standard conditions and normal water curing at 25°C. This demonstrates the feasibility of producing high-strength RPC with normal curing, even when using locally available materials.
Overall, these studies indicate that:

- Strength Development: Normal curing of RPC results in slower strength development compared to accelerated methods like heat or steam curing. However, sufficient strength can still be achieved with extended curing durations.
- Applicability: Normal curing is suitable for projects where early strength is not a critical requirement, and a cost-effective curing method is preferred **(Bahedh and Jaafar, 2018). Table 1** summarizes the effects of curing type on the characteristics of RPC.

Table 1. The effect curing type on the characteristics of RPC

Study	Curing Type	Main Findings
(Yang et al., 2008)	Heat curing (90°C)	Increased early-age strength, but potential for micro-cracking. Optimization of curing regime necessary to avoid detrimental effects on long-term performance.
(Zhuge et al., 2011)	Steam curing	Improved early-age strength and reduced permeability. However, potential for higher shrinkage compared to other curing methods. Requires careful monitoring and control of temperature and humidity to prevent adverse effects.
(Jassim et al., 2015)	Ambient curing	Simple and cost-effective, but slower strength development compared to accelerated curing methods. Requires longer curing durations to achieve desired properties. Suitable for applications where early strength is not critical.
(Kazemi-Kamyab et al., 2018)	Combined curing (heat + moisture)	Optimal balance of early-age strength development and long-term durability. Requires controlled environment and additional equipment, which may increase costs. Promising approach for high-performance applications where both early strength and durability are essential.

2.2 Warm Water Curing

The acronyms hot air curing (HAC) and hot water curing (HWC) are commonly used in various contexts. The results indicate that hot air curing exhibits inferior strength outcomes compared to autoclaving and hot water curing. For warm water curing, the strength development is higher; this is probably a result of the ongoing growth of the Calcium Silicate Hydrates (C-S-H) chain subjected to hot or warm conditions **(Yazıcı et al., 2009)**, yet superior strength outcomes relative to steam curing. Various durations (1 hour to 7 days) have been examined in the literature for temperatures spanning from 100°C to 200°C. The HAC method involves subjecting concrete specimens to elevated temperatures, directly exposing the samples to hot air and subsequent evaporation of surface moisture. Insufficient moisture for hydration increases unreacted portlandite during the early stages, resulting in reduced production of C-S-H. Furthermore, elevated temperatures and reduced moisture content induce swift hydration, forming C-S-H exhibiting a porous microstructure **(Hiremath and Yaragal, 2017).**

In high-alumina cement, Tobermorite and xonotlite may develop after prolonged exposure to high temperatures. For the 100°C and 150°C HAC, Tobermorite—a fibrous structure that resembles a needle—was found after 7 and 3 days, respectively. Furthermore, for the 150°C and 200°C HAC, secondary xonotlite particulates were found after 7 and 3 days, respectively. The synthesis of these chemicals can potentially be completed in less time than 72 hours. After 48 hours, secondary xonotlite particles were formed when 12-hour high-pressure water curing (HWC) was combined with temperatures between 150°C and 200°C **(Hiremath and Yaragal, 2017)**. **Fig. 1** shows the microstructures of Tobermorite and Xonotlite **(Ahmed et al., 2021).**

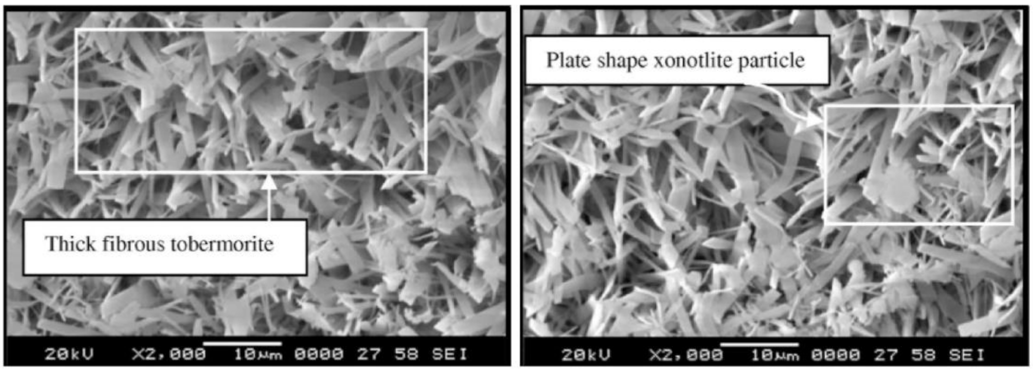

Figure 1. The development of Tobermorite at 150°C for three days and the development of xonotlite at 200°C for three days were examined using a high-temperature autoclave **(Ahmed et al., 2021).**

After presetting a pressure of 60 MPa, Dugat heated new RPC samples to 90°C and 250°C for heat curing. RPC was able to attain a static Young's modulus of 36,000 to 74,000 MPa and a compressive strength of around 500 MPa **(Rahmatabadi, 2015). (Bonneau et al., 1996)** looked at the confinement performance of the RPC inside a steel tube. Their research discovered that hot water curing at 90°C and in low-pressure steam chambers at the precast factory could achieve a compressive strength of up to 200 MPa **(Rahmatabadi, 2015).**

(Zhang et al., 2019) studied the properties of RPC after being subjected to different curing methods. The results revealed that hot water curing has the best results with 4% steel fibers, where the compressive and tensile strength have improved to 19.2% and 15.2%,

respectively. Hot water curing gives the best results, and hybrid curing gives 63% better properties in which the compressive strength has risen to 180 MPa **(Hiremath and Yaragal, 2017).** According to **(Abdulrahman et al., 2018)**, the best curing method (in terms of how well it improves the mechanical qualities of the RPC) is soaking in hot water at a temperature of 90°C.
Compressive strength for RPC mixes, including magnetic water, rises proportionally. On the other hand, at 28 days, the enhancing percentages for normal, autogenous, warm-water, and high-temperature curing were 7.66%, 8.43%, 8.86%, and 9.15%, respectively. The method of high-temperature curing demonstrated the most significant gain in compressive strength, with increases of up to 34.4, 30.6, and 28.52% after 7, 28, and 90 days, respectively **(Khreef and Abbas, 2021)** mentioned in his investigation, several previous researchers examined RPC improvement either by magnetized water or different curing ways. The consequence of selecting methods other than old-fashioned water curing is also higher in the first seven days than at later ages.

2.3 Steam Curing

Steam curing and hot water curing are sometimes used. Concrete strength develops quite quickly when using these curing procedures. These methods are best suited for precast concrete work. In steam curing, the temperature of the steam should be limited to a maximum of 75°C since the concrete may dry too quickly if sufficient humidity (about 90%) is not present. In hot water curing, the temperature can be elevated to any limit, such as 100°C. After the specimens have been created, they must be kept undisturbed in their moulds for at least one hour at a temperature of 27+ 2°C before being immersed in the curing tank. The period between adding water to the components and immersing the test specimens in the curing tank must be at least 1 hour 30 minutes but not more than 3 hours 30 minutes **(Pawar and Kate, 2020).**
The long-term act of steam-cured concrete prefabricated components in diverse harsh conditions was tested, and it was discovered that long-term water-curing increased the surface permeability of steam-cured concrete **(Zou et al., 2018).**
Steam curing also directly impacts the internal moisture of RPC, leading to increased permeability. As temperature rises, the effects become more pronounced **(Shi et al., 2021).**
After the best heat treatment parameters were identified, the effect of those parameters on the act of 6 mm steel fibers applied at a 2 % volume was assessed. The compressive strength and three-point flexural strength were evaluated with a deformability assessment. The primary determinant of the characteristics of the reactive powder concrete (RPC) being studied was the temperature at which steaming and autoclaving were conducted. Reactive powder concrete (RPC) curing circumstances also significantly impacted post-critical strains in composites comprising discrete reinforcement **(Zdeb, 2017).**
The key deduction is that steam-cured concrete can advance the initial strength of concrete; nonetheless, heat damage, shrinkage cracking, late ettringite creation (DEF), and other variables result in late strength rising more gently or even worsening. As a result, it is required to implement measures for improvement **(Zhou et al., 2022):**

1. To guarantee that the concrete's early strength satisfies the standard, load high-activity mineral additives and a small number of low-activity mineral admixture mixes. This will allow for the following expansion of concrete reactions.
2. Regulate the concrete's temperature gradient and secure time to permit the formation of the concrete's first structure **(Aydin and Baradan, 2013; Mostofinejad et al., 2016)**.

(Teichman and Schmidt, 2004) looked at the structural characteristics of Reactive Powder Concrete (RPC) and how they affect its durability and strength. The samples underwent two stages of a 48-hour steam curing procedure at 90°C and a 168-hour heat curing process at 250°C. The last step was a 2-day de-moulding phase. The investigators used freshly acquired RPC samples and applied a fixed pressure of 50 MPa on them during their study. There is documentation of a maximum compressive strength of 487 MPa **(Rahmatabadi, 2015)**. The utilization of steam curing has the potential to expedite the pozzolanic effect and enhance the microstructural characteristics of the resultant hydration products **(O'Neil, 2008).** The non-crystalline state of hydration products is maintained after steam curing. Elevating the curing temperature has the potential to expedite the cement hydration mechanism and enhance the initial compressive strength of concrete. When concrete is exposed to high-temperature conditions, hydration calcium silicate undergoes a process whereby it loses a portion of its water content, resulting in the formation of xonotlite-type calcium silicate. This transformation is associated with an increase in strength **(Wang et al., 2014).**

2.4 Hot Air Curing

The results of many research articles reflect that hot air curing leads to enhanced strength (**Fig. 2**) but are still lower than hot water curing, yet they are better than steam curing. The reason behind the lower properties is that the hot air tends to remove humidity from the surface of concrete, lowering the hydration process and hence lowering the properties **(Hiremath and Yaragal, 2017; Xu et al., 2023)**.

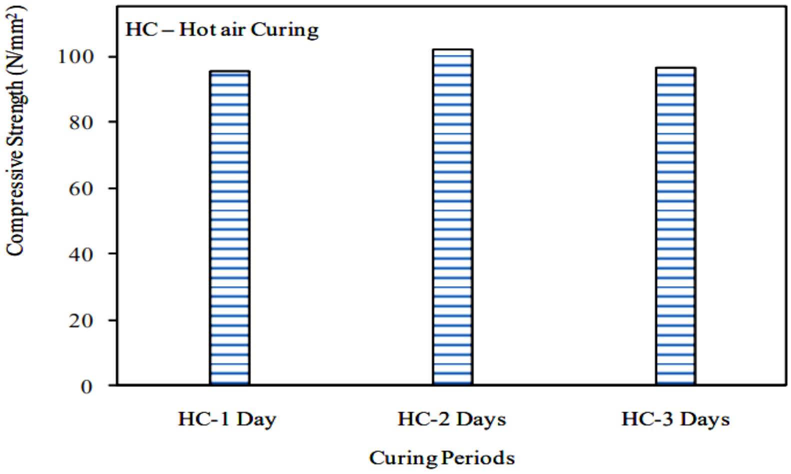

Figure 2. Compressive strength of RPC for different days of hot air curing **(Hiremath and Yaragal, 2017)**.

(Canbaz, 2014) have studied the effects of various curing techniques on the mechanical durability of reactive powder concrete (RPC). Comparison research was conducted to determine whether a short-term hot air curing approach or the usual curing method is better at promoting the early development of strength. Canbaz's research revealed that short-term hot air curing could significantly accelerate the early age strength development of RPC. This is a crucial finding as faster curing times can lead to substantial time and cost savings in construction projects **(Canbaz, 2014).**

Hot air curing significantly impacts the mechanical properties of concrete. The primary impact is advancing a more compact microstructural composition, accompanied by the emergence of calcium silicate hydrate (C-S-H) phases, leading to elevated mechanical characteristics. Like the traditional method of heat curing concrete or using an autoclave, the process of curing RPC also results in a noticeable alteration in its microstructure **(Yazici et al., 2013).** The thermal curing method significantly impacts Reactive Powder Concrete (RPC) strength enhancement. The densification of the microstructure, which leads to the formation of calcium silicate hydrate phases, is associated with increased mechanical properties. Silica fume rapidly dissolves and combines with portlandite during the heat treatment to generate new hydrates categorized as C-S-H **(Courtial et al., 2013)**.

2.5 Auto-Clave Curing

Autoclaving is typically utilized for periods that do not surpass 24 hours—autoclaving results in the formation of tobermorite-like structures that occupy void spaces. The pores in question are found to be both entrapped and entrained with air, a phenomenon that arises due to the excessive utilization of superplasticizers **(Kosmatka et al., 2003)**. Typically, these pores remain unoccupied during the process of standard curing. The significant increase in strength observed during autoclaving can be attributed primarily to the expedited creation of Tobermorite and xonotlite within less than 24 hours. **(Yazici et al., 2013)** reported the detection of tobermorite structures that were fibrous and foiled in nature. After subjecting the sample to autoclaving for 6 hours, these structures were observed at pressures of 1, 2, and 3 MPa. The study conducted by **(Yang et al., 2016)** identified the presence of the substances above following a 10-hour autoclaving process at 0.5, 1, and 1.5 MPa. One may argue that there is a crucial period for each set of pressure and temperature parameters. Mechanical qualities might be negatively impacted at this point. According to Yazici, mercury porosimetry measurements and SEM micrographs showed that the autoclaving technique had changed the microstructure of RPC **(Yazici et al., 2013)**.
Steam curing lowers strength compared to the other techniques examined in this study. Chloride permeability and penetrability are sharply lower with increasing slag replacement, except for autoclave curing, which is the least susceptible to slag replacement among the other curing modalities examined in this work. Slag is added, and this results in a reduction in continuous pore width that is consistent with the initial current (I.C.) found by the rapid chloride permeability test (RCPT) **(Aldeaa et al., 2000)**.
Higher fly ash content UHPC compositions require a higher autoclave pressure to reach maximum strength. Furthermore, the strengthening effect of steel fibers becomes more vital with more tremendous autoclave pressure and longer autoclave times. It has been noted that the fraction hardness of pure cement ultra-high performance concrete (UHPC) is decreased when autoclave curing is used. Nevertheless, it has been shown that adding fly ash (F.A.) can lessen or even remove this adverse effect. By extending the autoclave time and using fly ash, UHPC samples' porosity is reduced **(Chen et al., 2018)**.

3. CONCLUSIONS

Reactive powder concrete (RPC) curing is crucial to obtaining necessary qualities like strength and durability. Curing is vital, particularly in the early phases of concrete, to improve the cement's hydration process and regulate moisture transport into and out of the material.
The summary of what is mentioned above can be listed below:
- The increase rate in compressive strength in normal curing is higher than in the steam

curing.

- Under certain curing conditions and short curing durations, accelerated curing up to three hours long has shown the best compressive strength when associated with other curing ways. The hot water bath curing system generated the greatest compressive strength for twelve hours from the different curing methods. Strength is found to increase with temperature under hot air curing conditions.
- Compressive strengths of more than 200 MPa were attained following three days of water curing at 90 C and applying an 80 MPa presetting pressure.
- Steam curing significantly impacts mechanical qualities more than other curing methods. Direct tension strength increased more quickly at the younger age (7 days) than at the later ages. Furthermore, utilizing steam curing procedures yields greater values than other curing regimes, and the data reveal a rise in RPC density at early ages over later ages.
- Because various binders require different setup durations, the preset time for steaming is crucial and should be checked. Time t1 should be 6 hours for the cement utilized in this investigation. In terms of mechanical qualities, autoclaving with this parameter was unimportant; nevertheless, from a practical standpoint, it appears that the ability to autoclave after demolding is a substantial convenience, and as a result, the time t1 before ramp time may be connected to binder setting time.

Test findings also showed that cement-based reactive powder concrete performed mechanically well after autoclaving. The results of this investigation show that the transition of a-C2SH into the tobermorite structure—which is needed to achieve superior mechanical performance—was also influenced by quartz powder. More sources of silica, such as silica fume, are required to produce composites with exceptionally high mechanical performance. Mercury porosimetry studies and scanning electron microscopy analysis supported these findings.

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Credit Authorship Contribution Statement

Zena K. Abbas**,** University of Baghdad, College of Civil Engineering, Department of Civil Engineering: Supervision, reviewing, evaluation & editing. Ahmed Luti: Writing – reviewing & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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دراسة في طرق المعالجة المختلفة في قوة الخرسانة المسحوقة التفاعلية – مراجعة

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الخلاصة

تصنف الخرسانة ذات المسحوق التفاعلي (RPC) على أنها شكل من أشكال الخرسانة التي تتميز بخصائص ميكانيكية ومتانة استثنائية. تتمثل الأهداف الأساسية لتطوير مسحوق الخرسانة التفاعلية (RPC) في تعزيز بنيتها المجهرية، والتخلص من الركام الخشن، وتحسين تعبئة الجسيمات، وزيادة متانتها. من أجل الالتزام بهذه المبادئ، يتميز مسحوق الخرسانة التفاعلي (RPC) باستخدامه لكمية كبيرة من الأسمنت والمواد البوزولانية. ومع ذلك، فإن عملية الإنتاج هذه مرتبطة بتكاليف عالية وليست مستدامة بيئيًا. بحثت هذه الدراسة في طرق المعالجة لـ RPC ونسب المكونات التي تؤثر على مقاومة الانضغاط. وتقدم الدراسة الحالية نظرة عامة موجزة عن تعزيز البنية المجهرية للخرسانة، وتعبئة الجسيمات، وسمات المتانة لخرسانة المسحوق التفاعلي (RPC)، مع تحديد المواد المكونة التي يتم دمجها فيها. تم التأكيد بشكل بارز على التقنيات المستخدمة في المعالجة، والتي أثبتت بأن عملية معالجة مسحوق الخرسانة التفاعلي (RPC) هي عامل حاسم في تقدمها مثل الانضاج الاعتيادي، الانضاج بالماء الساخن، الانضاج بالهواء الساخن، الانضاج بالبخار والانضاج الذاتي، حيث إن لها تأثيرًا كبيرًا على تفاعل مكوناتها. تمت ملاحظة أن استخدام طرق الانضاج التي فيها درجات حرارة عالية تعمل على تسريع تفاعل الاماهة المسؤول عن تكوين المركبات التي تعطي الخرسانة قوتها خصوصا لإنضاج الذاتي الذي يمكن أن يؤدي إلى نتائج قوة فائقة مقارنة بتنفيذ المعالجة بالبخار.

الكلمات المفتاحية: مسحوق الخرسانة التفاعلي، المعالجة، المعالجة بالضغط الدوار، المعالجة بالبخار، الخرسانة فائقة الأداء.