Ask Jon Eakes

Myths and misconceptions about concrete and water

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A comment from a reader:
"I notice in your section on self leveling concrete that you mention about needing to let the water out before putting anything on top of the new compound. (Self Leveling Concrete) This is a common misconception about concrete, in fact the water does not leave, it becomes part of the concrete. You could seal it with watertight plastic and the concrete will still setup exactly the same." --Mike
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People are often a bit confused about things like this and half truths can cause a lot of household damage so let me share a bit of information about concrete so that we can all understand about water and concrete. In fact I am revising this article in 2024 because readers have brought to my attention that I was not clear and not always scientifically correct in what I initially wrote -- thanks especially to Dave Van.
We need to make a distinction about our concerns about the role of water in mixing, hydrating and curing the concrete and then our concerns about the excess water that is no longer needed and can cause us problems. In my article about self-levelling concrete, I was mostly concerned with the problems that can develop from the excess water when final floor coverings are put on too soon. I have clarified that in the Self Leveling Concrete article
Yes, as Mike says you can cover concrete with plastic and it will setup, or “cure” very well. In fact, that is often done to help it to cure in dry weather. Mike states that the water does not leave, it becomes part of the concrete. Here he is right in that some of the water becomes chemically part of the concrete, but certainly not all the water is absorbed by the process of hydration as Mike suggests. Importantly, it is only a small part of the initial water in the mix that is actually taken in as part of the final chemistry of hydrated concrete.
My focus was that after the chemistry has done its job, the vast majority of the water in the initial mix needs to evaporate or dry out – or at least come to equilibrium with the environment. For example, to avoid wood rot, after pouring a basement foundation wall for an ordinary residential basement there remains about 600 gallons of water that needs to evaporate to get the concrete to the same moisture content state as the studs and floor joists of the house. That is a problem when we finish the basement only weeks after pouring the concrete. However, a concrete pillar sitting in a lake is quite happy being saturated forever by the lake. The concrete doesn’t care about its moisture environment but a house in contact with this concrete does care. Once the H2O uptake by the chemical process is finished, the concrete is hydrated or cured and the rest of the water that helped create a fluid environment for the process needs to be dealt with.
If there is too much water in the mixture, the chemicals and granules are thinned out and the resulting concrete will be weak -- which is why water should never be added to specifically formulated pre-mixed concrete from a truck in order to make it flow -- but rather special chemicals can be added called plasticizers that will make it flow more easily into its forms without reducing its final strength. This is also why you should really follow to the letter the package instructions when mixing your own concrete -- unless you know how to do a "slump" test.
If there is too little water, or you allow the water to evaporate too quickly, the chemical cure will not be complete and the concrete will end up weaker as well. So the right quantity of water in concrete is measured by something called "slump", packing the wet concrete into a little "sand bucket" (not just any bucket but one made for this test), tipping it over like when making sand castles on the beach and measuring how much it slumps down from the full bucket size. Either too much or too little water will show up clearly with this test. Different concrete mixtures, intended for different applications will each

have their own proper "slump" measurement.
You may already have experience with this distinction between drying and curing with drywall compounds. Premixed drywall compound (the stuff you buy wet in a bucket) must dry to get hard whereas powder mixed drywall compounds and plasters use water for a chemical reaction -- they get hard or cure first, then slowly dry out. (If you tried to "pre-mix" them, they would simply harden in the bucket.) Both end up dry but if you re-wet the premixed compound, it gets soft again. If you re-wet plaster it remains hard because the chemical bonds are still there -- as with concrete. Click HERE for a video on the difference between evaporation set and chemical set compounds.
Concrete needs a very specific water content for a few hours until it "sets" -- which means that it gets hard enough that more water or rain will not wash it away. Then it needs to stay moist for a minimum of 3 days to obtain its minimum acceptable strength. When the atmosphere is hot and dry we often cover the concrete to reduce evaporation, or put a sprinkler on it to keep it wet. So that part of what Mike says is true, concrete does not need to "dry" to get hard. "Ideally" the concrete will be kept wet for 28 days, the time it takes for the chemical reactions to complete their actions giving the most strength possible for a given concrete mixture.
Once the cure is completed, the water is no longer needed in the concrete. What has not become part of the concrete, or drained out or evaporated is still there as water. As far as the concrete is concerned, it makes no difference if the water stays (pillars in the lake) or goes (columns on a building). In fact what eventually happens is that the water content of the concrete comes into equilibrium with its environment. If soil in contact with the concrete is dry, it will dry out the concrete. If the soil is wet, it will add water to the concrete. In fact for houses, foundation walls and often footings are covered with a moisture barrier to help keep the concrete dry -- actually to help stop the migration of water from the soil through the concrete and into the house.
In the same way, air humidity levels will come into balance with the concrete and most dry winter heated basements will dry out the 600 or so gallons of water in the original foundation mix in about two heating seasons or 18 months.
Sealing concrete can slow down water evaporation, but will not stop it. A concrete sealer's primary function is to prevent liquid water from soaking into concrete and secondarily to harden the surface reducing concrete dust formation.
In residential construction, if concrete still has mix water in it (we often call that "green" concrete or "young" concrete), there can be problems caused by that water as it evaporates out of the concrete. We see that with Ontario's bag insulation hung on basement walls with large quantities of water getting caught in the insulation as it tries to move toward the basement but hits that plastic sheet that is holding the insulation in place. With floor coverings put over wet concrete, whether the water comes from the original mix or from a drainage problem, unprotected materials will pick up that moisture and expand, sometimes to the point of destroying the floor.
So that is why we either want to wait for the concrete to dry before covering it, or take precautions to prevent the migration of water or water vapour to other building materials. If you look back at Mike's note at the top, I had mentioned in my database entry about self-levelling concrete that you should let the concrete dry out before putting anything on top of the new compound. The concrete compound couldn't care less, but the new floor covering could be destroyed by all that water, and there is a lot of water in self-levelling concrete that will dry out whether you want it to or not. The whole question is where will it go? I prefer to wait a couple of days and let it evaporate into the room where I can ventilate it outdoors rather than fight trying to protect a floating floor from all that moisture.
Oh- one last detail: to keep a clear distinction between the words Concrete and Cement, just remember that Cement is the glue that holds the Concrete together. So we do not have cement floors -- we have concrete floors.

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