

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

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.

Yes as Mike says you can cover concrete with plastic and it will setup very well, in fact that is often done to help it set-up in dry weather. No, water does not become part of the concrete and it will eventually reach equilibrium with the environment around it, either getting wet or drying out. So just what is the role of water while making concrete and after it is cured?

The presence of water in a concrete mixture is essential to provide the environment in which the chemical reactions that cure concrete to a permanently hard substance can take place.

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.

Contrary to Mike's statement, water is not drawn in to become part of the concrete; it is just the key element in permitting the chemical reactions to happen -- what we call curing. Note that I did not say "dry", but "cure". 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 and power 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. It has not been "used up" nor has it "become part of the concrete". What has not 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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