

# Density vs. Weight vs. Volume vs. Strength

## A Lab & Field-Service Note

*onBalance* – Que Hales, Doug Latta and Kim Skinner

Pool treatment chemicals are designed to be dispensed by weight. Unfortunately, they are often dispensed by volume instead. This is not valid because the weight and density of the chemicals can vary widely.

Remember the old riddle, “What weighs more, a ton of bricks or a ton of feathers?” And the corollary, “If you dropped a ton of bricks vs. a ton of feathers off a roof, which would hit first?” This is also called an apples vs. oranges question... Here are a few examples of why this is important:

Material	Weight (Pounds/Ounces)
Empty "1 Pound" Coffee Can	0
Calcium Chloride (dihydrate)	1 lb 10 oz
Calcium Chloride (prill)	1 lb 12 oz
Diatomaceous Earth	14 oz
Calcium Hypochlorite	2 lbs 1.8 oz
Sodium Bicarbonate	2 lbs 7.5 oz

Here is a practical example. You are doing the start-up on a new plaster pool, and the pool water when filled measures 100 ppm of calcium hardness. You decide that you want to raise it to 150 ppm, and the water volume is 10,000 gallons. The dosage formula tells us that the requirement is 6 pounds of calcium chloride dihydrate:  $(10,000 \div 83,300) \cdot 50 \text{ ppm} = 6 \text{ pounds}$ .

Here are the resulting ppm increases based on using prill (94%, calcium chloride anhydrous), and using a 1 pound coffee can:

Product	Dose	Ounces	Increase in 10,000 gal (ppm)
Calcium Chloride Dihydrate (77%)	6 pounds	96	50
Calcium Chloride Prill (94%)	6 pounds	96	61
Calcium Chloride Dihydrate (77%)	6 cans	156	81
Calcium Chloride Prill (94%)	6 cans	168	107



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