Putting Electrolyte in Nickel Iron Batteries

Materials list:

approx 1 lb KOH (dry) per battery

approx 1/3-1/4 gallon distilled water per battery, plus extra for cleaning

safety glasses and gloves

plastic bucket- clean and new, with lid

plastic mixing spoon

plastic measuring cup

grams scale

funnel or other means to put electrolyte in battery

hydrometer (optional, but recommended) to measure specific gravity

First and foremost, BE CAREFUL. The electrolyte in nickel iron (NiFe) batteries is made up of distilled water, potassium hydroxide (KOH), and sometimes lithium hydroxide. Although NiFes are less toxic than other batteries, the KOH is caustic. If you get it on your skin, it will burn you, in a similar manner to concentrated bleach. DO NOT GET ELECTROLYTE OR POTASSIUM HYDROXIDE IN YOUR EYES. IT COULD BLIND YOU. WEAR SAFETY GLASSES AND BE PREPARED TO RINSE YOUR EYES WITH WATER. Wear gloves. You will be dissolving KOH into water. It generates heat in the process. NEVER, NEVER, NEVER pour water in the KOH. Pour KOH into water *slowly.*

It is important to keep all equipment as clean as possible. Contaminants in the electrolyte will impair the performance of your battery. Clean equipment with distilled water. Use a clean, new bucket with a lid, and cover the solution when it is cooling.

A single 10 amp hour Troily battery requires approximately 1300g (one third of a gallon) distilled water and 390g KOH. A 2 pound container of KOH from Duda Diesel (dudadiesel.com, item 2drhdp) is 900g, enough for two 10 amp hour batteries, with some extra.

You will need a clean bucket large enough to mix the water and KOH. The ratio of KOH to water is 3 parts KOH to 10 parts water by weight. (Not 1 to 3.) Weigh your water and KOH to be sure. Put the water in the bucket, then add the KOH *slowly*, stirring as you go. Do not put in all the KOH at once. Monitor the water temperature. Do not let it overheat. Stir with a stainless or plastic spoon, not a wooden one.

If you have a hydrometer, test the specific gravity of the solution after it has cooled. It should be between 1.19 and 1.21.

You will need to let the mixture rest and cool for a number of hours before putting it in your batteries. Do not put hot or warm electrolyte in your batteries. Keep your gloves and eye protection on while you fill the batteries. To fill the battery, a small squirt bottle is helpful. Fill to the "max" line on the battery. Wipe up any spills. KOH is caustic but not toxic. Excess can be disposed of. Wash hands throughly when you are finished.

Once a month, you will need to add distilled water to the batteries. Do NOT add more electrolyte, tap water, bottled water, or anything other than distilled water. Add distilled water at least to the “max” line on the battery. More is okay, as long as it does not overflow.

After 5 - 8 years, the electrolyte will need to be poured out of the batteries and refreshed. Adding a small amount of lithium hydroxide increases the life expectancy of the electrolyte by a couple of years. We do not currently have a good source for lithium hydroxide. (You can find it online, but it is expensive.) The amount of lithium used is small, about .06 parts lithium to 1 part water by weight.

Disclaimer: