

Water, Water, Water

soft water

- contains only water and ions that do not precipitate (ppt)
- lathers easily with soap
- no residue when it is boiled away

hard water

- contains calcium salts
- does not lather easily
- produces scum with soap
- white residue when water is boiled away
- 2 types
 - temporary
 - permanent

temporary hardness

- limestone (calcium carbonate) is dissolved in it
- when you heat this water, the dissolved limestone “falls” out of solution (ppt)
- scale in a kettle
- plugged steam irons
- after boiling the water is no longer hard

permanent hardness

- this has CaSO_4 and CaCl_2
- these do not ppt when heated so the water stays hard

water softeners

- eliminate hard water
- contain zeolites which are ion exchangers
 - zeolites have sodium ionically bonded to them
 - when calcium goes past, the zeolite exchange the Na for Ca
 - now the zeolites has Ca ionically bonded to them
 - to get rid of Ca, you need to add NaCl (water softening salt)
 - this regenerates the system, Ca is forced off the zeolite and Na is ionically bonded on again