

Effect of Strong Magnetic Fields on Water

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Since the 1930s, magnetic devices have been produced that are claimed to reduce the amount of scale in water pipes. A hundred or so papers have been published reporting measurable effects of magnetic fields on water. Several theoretical investigations of the phenomenon have also been published, mostly supporting the observations. However, the subject remains highly controversial due to low reproducibility and little consistence of the reported results. All these controversies can now be resolved using recently developed methods and computer codes that provide accurate description of properties of molecules in fields of arbitrary strength. Calculations have been performed for the water dimer and trimer in magnetic fields of varying strength, including the value of 40 tesla, the strongest field currently available in laboratories. Since two- plus three-body interactions describe liquid water very well, the results of these calculations allow making conclusions about properties of condensed phases of water. Furthermore, since one literature hypothesis was that the observed effects may be due to the molecular oxygen (a paramagnetic molecule) impurities present in water, calculations have also been performed for water-oxygen clusters.