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In many important theorems in the homological theory of commutative local rings, an essential ingredient in the proof is to consider the annihilators of local cohomology modules of the ring with respect to an ideal (not necessarily the maximal ideal). One interesting result, proved by Hochster and Lyubeznik in independent cases, says that in the case of a regular local ring containing a field, a local cohomology module (of the ring) is nonzero if and only if its annihilator is zero. We will examine the annihilators of local cohomology modules in other situations and, in particular, that of the top local cohomology module of an arbitrary local ring with support in a given ideal. (Received February 16, 2010)