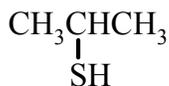
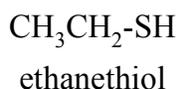


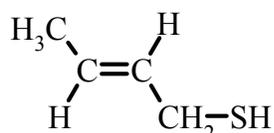
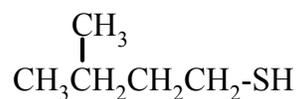
There are many “skunkish” substances but not all of them are found in skunks. Chemically, these “odiferous” substances are predominately low molecular weight organic compounds containing sulfur. They are detectable in minute amounts by the human nose. The most potent compound, ethanethiol (also called ethyl mercaptan (common name)), is detectable at a concentration of about 200 parts per trillion (200 g thiol per 1,000,000,000,000 g total) in air.



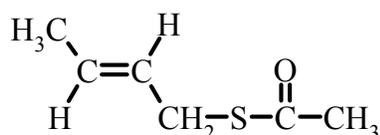
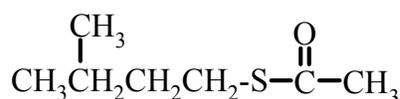
2-propanethiol



1-butanethiol

*trans*-2-buten-1-thiol

3-methyl-1-butanethiol

*trans*-2-butenyl thioacetate

3-methylbutyl thioacetate

Ethanethiol, 2-propanethiol, 2-butanethiol and 2-methyl-2-propanethiol are added to commercial natural gas and propane (which have no odor of their own) providing an instant warning of a gas leak.

1-Butanethiol closely mimics the smell of skunks and was considered the compound present in skunk anal sacs (the contents may be sprayed to a distance of several meters). Further investigation of skunk spray revealed several compounds related to 1-butanethiol, but not 1-butanethiol, itself. (1-Butanethiol does occur naturally in bitumen.) It has been suggested that skunks use these closely related butyl mercaptan derivatives as a means of distinguishing different skunk species. For example, the striped skunk (*Mephitis mephitis*) produces both *trans*-2-buten-1-thiol and 3-methyl-1-butanethiol, along with the thioacetates of each of these compounds (shown above). The spotted skunk (*Spilogale gracilis*) produces the two thiols, but not their thioacetate derivatives, and the hog-nosed skunk (*Conepatus mesoleucus*) synthesizes *trans*-2-buten-1-thiol and *trans*-2-butenyl thioacetate, but neither 3-methyl-1-butanethiol nor 3-methylbutyl thioacetate. In the three species examined, these thiols and thioacetates may comprise up to 90% of the animal's defensive secretion.

Although skunk scent is detectable by the human nose at a concentration of 10 parts of scent per billion parts of air, the skunk's strategy is, apparently, chemical aggression, not a simple warning message wafted to would-be assailants. The ejected defensive secretion causes retching and nausea, driving away potential predators. The best means of removing the pervasive smell is to oxidize the thiols to the less odorous sulfonic acids using dilute hydrogen peroxide (for humans and pets) or chlorine bleach (for everything else).