

2.7 LEL and preventative explosion protection

Flammable gases and vapors can form ignitable mixtures when combined with air, but the ratio of flammable gas to oxygen (or air) must lie within certain limits.

The lower explosion limit (LEL) is defined as the concentration of combustion gas (stated in Vol.-%) at which, under standardized conditions, the gas-air mixture can be ignited and will continue to burn on its own accord. The LEL of all known flammable gases and vapors lies in a range of approximately 0.5 to 15 Vol.-%. The LEL of hydrogen in air, for instance, is 4 Vol.-%. Accordingly, a gas sample containing 2 Vol.-% of hydrogen in air can definitely not be ignited.

Concentration limitation

This behavior of gases and vapors has important consequences for practical explosion protection. If a flammable gas cannot be ignited below its LEL, then we can protect people against explosions by measuring the gas concentrations continuously and using appropriate measures to ensure that concentrations never exceed a level such as half the LEL (50% LEL).

This method of preventative explosion protection is often referred to as a primary measure. What is prevented is not the ignition of the gas, but the very formation of an atmosphere which can explode. The preferred method of measuring these concentrations is to use infrared or catalytic bead sensors, which, when used for this purpose, must fulfill certain safety requirements.

