Gas Chromatography (Portable and Transportable)

Detectors[1]	Media	Detection Limit (µg/L or µg/kg) [2]	Samples per day	Interferences	Performance Tips and Limitations[3]
Volatile Organics					
Photoionization Detector (PID)	Soil	0.05-0.5[4] Using headspace technique (water utilized as extractant) 20-50.	15-35 depending upon level of QA/QC required	Chemical specific. Matrices contaminated with high concentrations of non-target compounds may pose co-elution problems.	This detector depends upon an ultraviolet lamp to ionize chemicals for measurement. The lamp comes in various strengths (e.g., 8.3, 9.5, 10.2, and 11.7 eV) with the 10.2 eV being the most common. The higher the eV rating the more chemicals that can be detected. Also the highest (11.7 eV) does not last as long as the others. This detector is best used for aromatic compounds (e.g., benzene, toluene) and chlorinated alkenes (e.g., TCE and PCE). It has poor response for alkanes (e.g., hexane and propane) whether chlorinated or not. A PID can also be used to detect inorganic compounds such hydrogen sulfide, phosphine, arsine, ammonia, and other species of nitrogenated compounds. Humidity and temperature can affect PID performance when used in the field.
Photoionization Detector	Water	0.05-0.5[4] for aromatics and chlorinated ethenes. Using headspace technique 1.0-5.0.			
Flame Ionization Detector[5] (FID)	Soil	No published values. Used for gasoline range organics.			This would be the detector of choice for a site where the contamination is not well characterized because it is sensitive to a broader range of organic compounds than the PID and ECD; however, it is not sensitive to alcohols.
Flame Ionization Detector[5]	Water	No published values. Used for gasoline range organics.			

Gas Chromatography (Portable and Transportable) (Continued)

Detectors[1]	Media	Detection Limit (µg/L or µg/kg) [2]	Samples per day	Interferences	Performance Tips and Limitations[3]
Semi-Volatile Organics Continued					
Electron Capture Detector	Soil	1.1-5.7[8] chlorinated pesticides, 57-70[7] PCBs and phthalate esters			This detector is extremely sensitive to halogenated chemicals and the detector of choice when the chemicals of concern are a mixture of halogenated pesticides or PCBs. It can also be used when the chemicals of concern are phthalate esters. The detection limits for the chlorinated herbicides MCPA and MCPP are much higher than other compounds (>100 µg/l).
Electron Capture Detector	Water	0.02-0.09[8] chlorinated pesticides, PCBs, and phthalate esters			

[1] Some GCs can be configured with two detectors, e.g., two different types of detectors coupled in series in order to detect a wide range of compounds eluting from a single column, or two identical detectors detecting the same class of analytes eluting from two separate columns with different characteristics (used to confirm the presence of an analyte).
[2] Detection limits should be determined at the beginning of a project and are chemical-specific for the chosen method and matrix.
[3] Before GC analysis begins, standard(s) containing each target analyte are run, to establish retention times and the instrument response. When choosing a GC for a project the sensitivity of the detector to the target analytes must be considered, as well as the type of column that will provide the best chromatographic separation. Unless the chemicals to be encountered at a site are well known, a single column GC will not provide positive identification of target analytes due to the possibility that unknown contaminants will elute at the same time as target analytes.
[4] SW-846. Estimated quantitation limits (EQLs) for groundwater and soil.
[5] FID detectors are generally not found in portable field GCs.
[6] Adapted from 40 CFR 136 Appendix A.
[7] All semi-volatile organic analytes require extraction before analysis. This step reduces the number of samples that can be analyzed in a day if only one analyst is available.
[8] SW-846 Method detection limits (MDLs) for organic-free water and sandy loam.