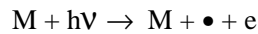

Photo-ionization explained

The PID is comprised of a light source that emits photons (a quantum unit of light energy) which are absorbed by the sample in an ionization chamber. Ions produced during this process are collected by electrodes. The current generated provides a measure of the analyte concentration. The following reaction takes place



The light source or lamp is the essential part. The wavelength of the light emitted depends on the gas inside the lamp. Wavelengths emitted by e.g. Xenon, Krypton and Argon corresponds to an equivalent of 8.4, 10.0 & 10.6, and 11.7 eV respectively.

Different tar components are detectable by various lamps. Naphthalene for instance has an ionization potential of 8.12 eV and can already be detected by a 8.4 eV lamp. Benzene on the other hand, having an ionization potential of 9.24, cannot and requires a 9.5 or higher eV lamp.

Table 1 Ionization potential of various compounds likely present in producer gas

Compound	IP (eV)	Compound	IP (eV)
coronene	7,29	hexane	10,18
pyrene	7,41	H ₂ S	10,45
acenaphthalene	7,68	ethylene	10,51
phenanthrene	7,86	acetic acid	10,66
fluorene	7,89	methanol	10,85
dephenylacetylene	7,90	formaldehyde	10,87
biphenyl	7,95	propane	10,95
fluoranthene	7,95	carbon	11,26
p-cresol	8,13	formic acid	11,33
indene	8,14	acetylene	11,40
naftalene	8,14	ethane	11,52
o-cresol	8,14	oxygen	12,07
m-cresol	8,29	methane	12,51
styrene	8,41	water	12,61
phenol	8,47	HCl	12,75
Xylene	8,56	N ₂ O	12,89
toluene	8,82	HCN	13,60
benzene	9,24	CO ₂	13,77
propene	9,73	hydrogen	15,43
ammonia	10,18	nitrogen	15,58