Although fog water is known for their higher concentrations than rain water, the extraction and the analysis of organic matters from these matrices are still very limited. To overcome the different problems related to the traditional liquid-liquid extraction (LLE), a new analytical method known as the solid-phase extraction (SLE) is developed and optimized allowing the LLE extraction on a solid support (XTR Chromabond column) for the analysis of different groups of organic compounds in fog water in one matrix. SLE is an accelerated, repeated, and scale-down form of LLE, more efficient, faster, and even less expensive than LLE. The base material of the XTR column is coarse-grained Kieselguhr known as celite or diatomaceous earth providing a high pore volume, large pore size, and constantly batch-to-batch quality. The best solvent for the SLE is a mixture of dichloromethane and ethyl acetate (50:50 % by volume). The extract is then concentrated under fume hood to 1 mL, derivatized with 50 µl of MtBSTFA for 1 hour at 80 °C, and then injected into different chromatographic techniques. Phenols and acids are injected to gas-chromatography coupled with mass spectrometer (GC-MS). Volatile pesticides, PAHs, PCBs, and OCPs are injected into the GC-MS/MS, while non-volatile pesticides are injected into the LC-MS/MS. The method is developed, optimized, and validated for most organic compounds for its linearity, recovery, repeatability, reproducibility, limit of detection (LOD), and limit of quantification (LOQ). It is studied with the use of matrix-matched curves in the concentration range between 0.05 and 150 µg/l. The correlation coefficient (R^2) for most targeted compounds is higher than 0.99. It shows a high sensitivity for all organic compounds expect for the volatile pesticides. The RSD for intra-day (repeatability) and inter-day (reproducibility) precisions are lower than 15% for most compounds, expect for few of them. The method shows also good recoveries ranging from 80 to 120% for 60% of the extracted compounds, while 25% of them have a recovery between 55 and 80%. Once developed, the method is tested for its efficiency on real fog samples collected from different locations in Alsace (France) and Lebanon.