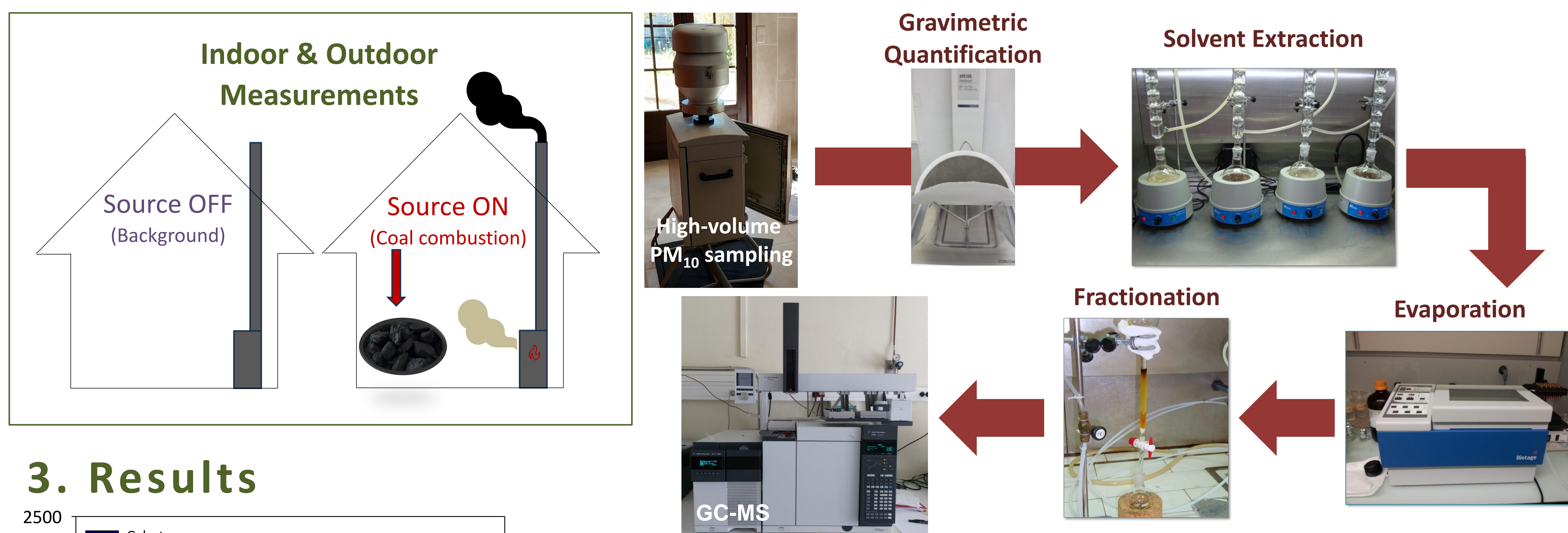


## 1. Introduction

According to estimates, household air pollution from solid fuel combustion was responsible for 3.2 million deaths in 2020, due to health-damaging pollutants such as particulate matter (WHO, 2022). Most deaths associated with indoor air pollution, caused using solid fuels, affect children under the age of five (resulting in low birth weight, acute lower respiratory tract infections, anemia, and premature mortality) and women (leading to chronic obstructive pulmonary disease and cardiovascular disorders) (Ali et al., 2021). Among the variety of solid fuels available, coal continues to be widely used for heating and cooking all over the world (Kerimray et al., 2017). Although emissions from indoor coal burning are a major public health concern in developing areas, little is known about indoor air quality in households equipped with coal burning appliances in higher income countries. To fill this gap in knowledge the present study aimed to evaluate the impact of residential coal combustion on indoor particulate organic composition.

## 2. Methods



## 3. Results

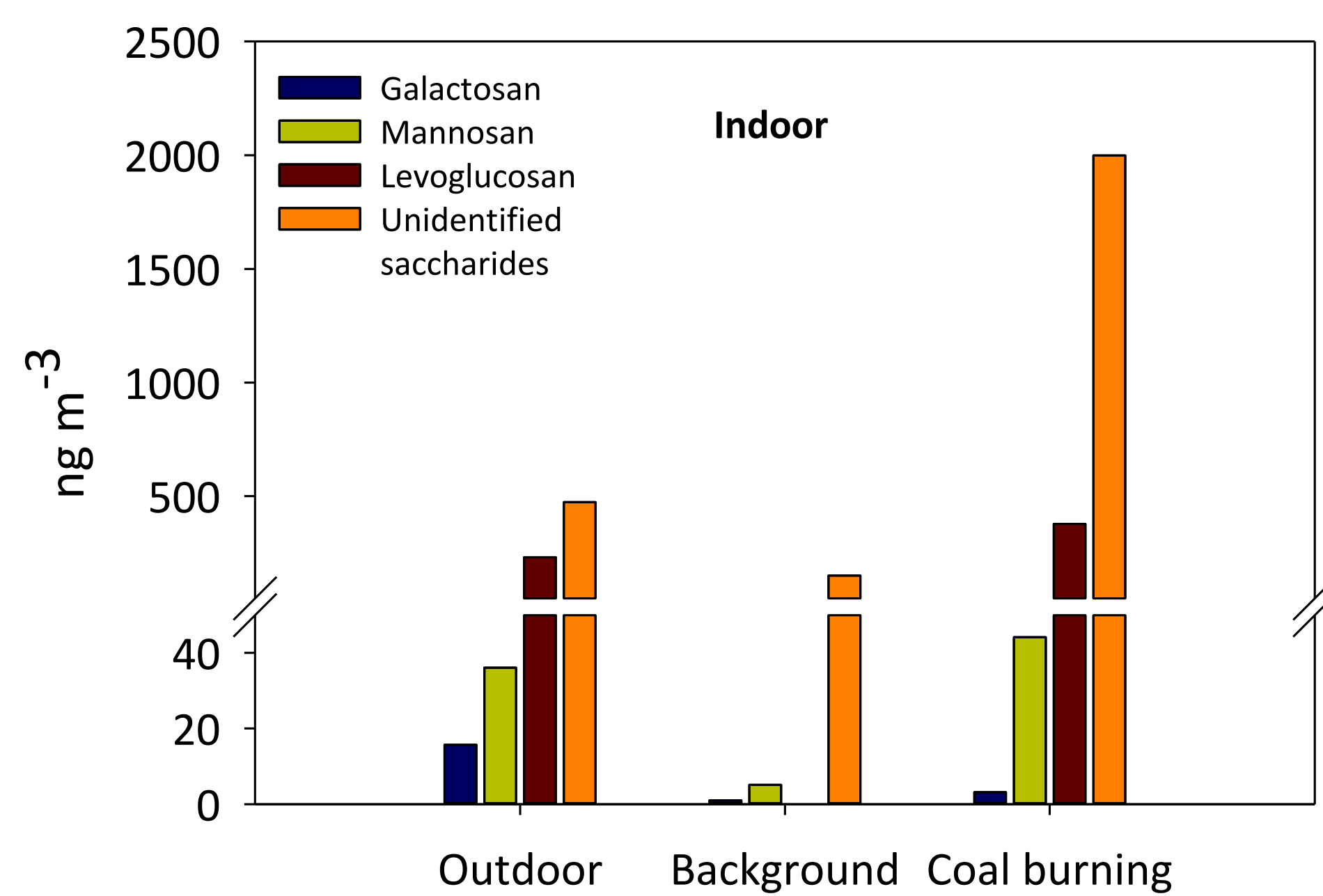


Fig. 1 Concentrations (ng m<sup>-3</sup>) of saccharides in PM<sub>10</sub>.

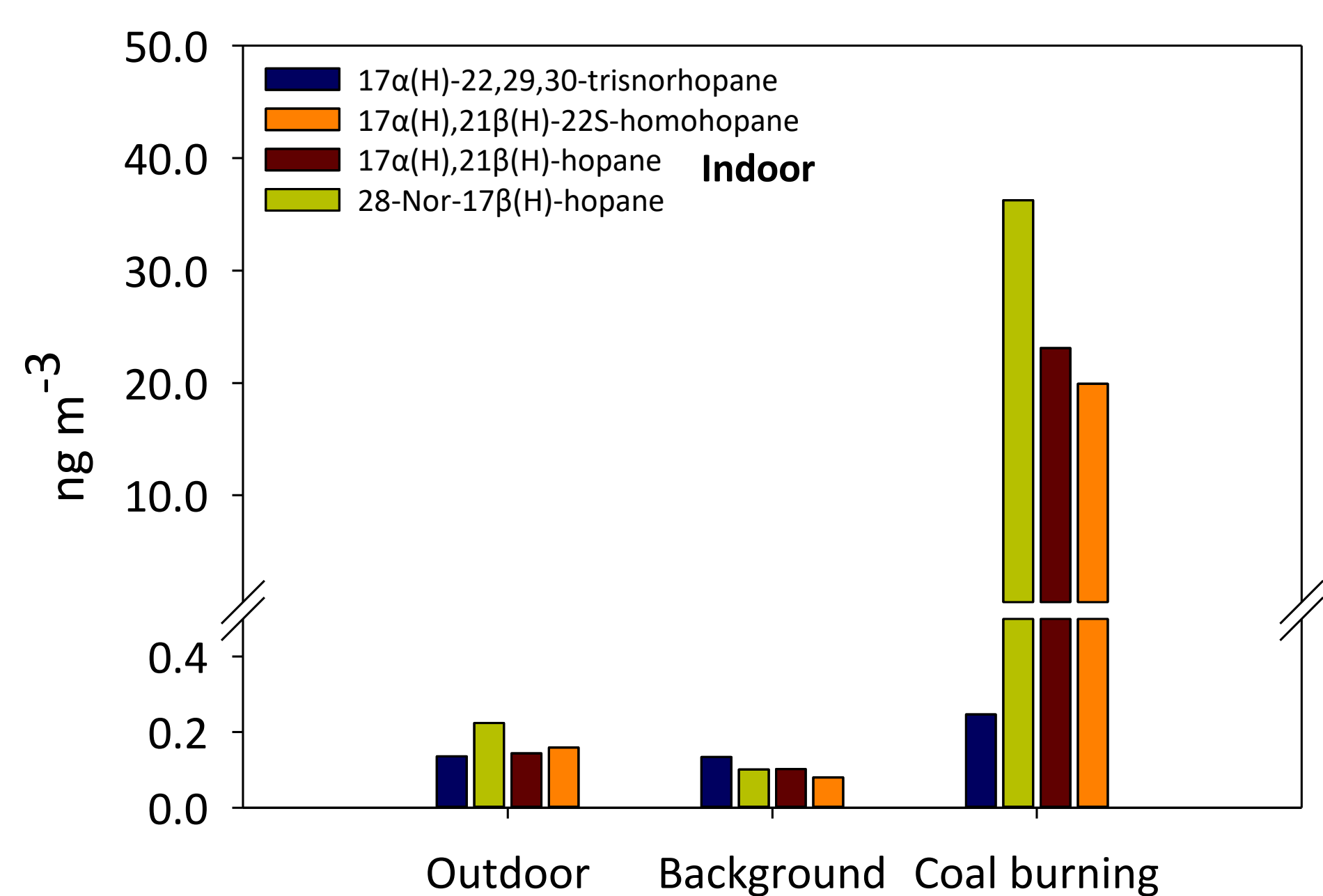


Fig. 2 Concentrations (ng m<sup>-3</sup>) of hopanes in PM<sub>10</sub>.

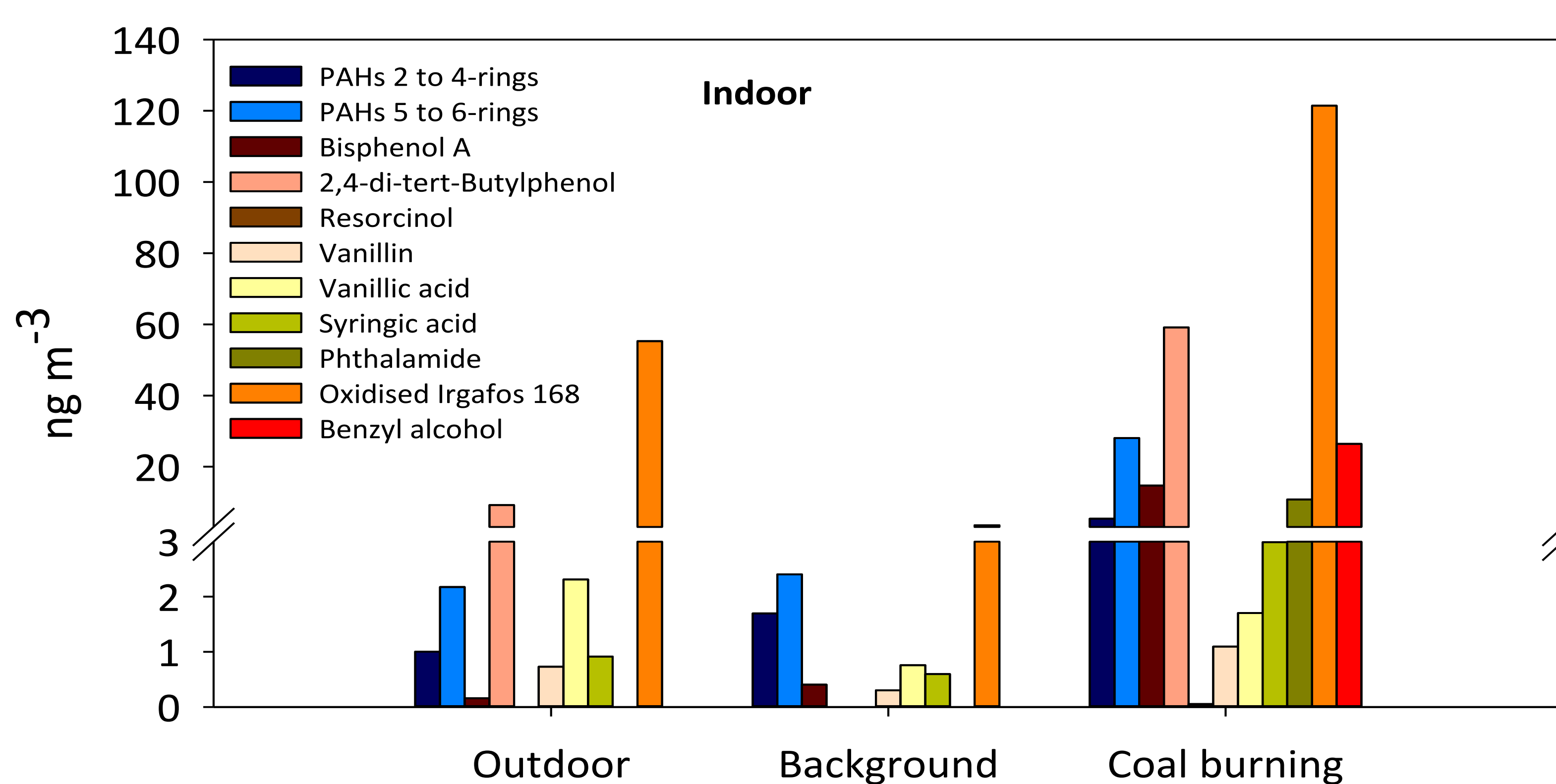


Fig. 3 Concentrations (ng m<sup>-3</sup>) of PAHs, phenolic compounds and other compounds in PM<sub>10</sub>.

Table. 1 Concentrations (ng m<sup>-3</sup>) of other organic classes (Σ) in PM<sub>10</sub>.

	n-alkanes	n-alkenes	Isoprenoid hydrocarbons	Aliphatic alcohols	Carboxylic acids	Unsaturated fatty acids	Dicarboxylic acids	Resin acids	Glyceridic compounds
Outdoor	11.86	nd/bdl	nd/bdl	29.98	46.55	0.419	115.7	9.37	22.05
Indoor Background	6.403	nd/bdl	nd/bdl	39.97	21.99	0.400	19.12	7.427	9.77
Indoor Coal burning	525.8	2.728	0.509	459.5	562.8	17.57	163.0	11.07	54.11

## Conclusions

- The detailed organic speciation revealed higher average concentrations of PAHs indoors during coal burning compared to outdoors and stove non-operation periods (background), with higher molecular weight PAHs constituting the majority of indoor PM<sub>10</sub> samples.
- PM<sub>10</sub> samples contained various oxygenated organic compounds, including levoglucosan, phenyl compounds, aromatic dicarboxylic acids, fatty acids, dehydroabietic acid, glyceryl esters of long chain fatty acids, phthalamide, and oxidised Irgafos 168. These compounds exhibited higher concentrations or were exclusively present during coal burning.
- Hopanes, generally pointed out as markers of primary particle emissions from coal combustion, were either absent or detected at significantly reduced levels in outdoor and background samples compared to the PM<sub>10</sub> concentrations observed during stove operation.