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Opinion and interpretation of emission testing results conducted on Air-Motion Roaster

Traditional coffee roasting processes are known to produce air pollutants, mainly particulate matter, combustion gases and volatile organic compounds (VOCs). Particulate matter emissions stem from the chaff (removed from the bean when roasting) and condensation by-products. Combustion gas emission mainly stem from combustion of hydrocarbon-rich fuel for heat generation. VOC emissions mainly stem from volatilisation of natural components in the beans and the reactions in the bean when roasting, as well as from fuel burning.

Skyside conducted tests for these pollutants in the exhaust duct of the Air-Motion Roaster 6kg Capacity Coffee Roaster system on 8 and 22 January 2021, with the roaster operating in batches of 12-minute duration each (please refer to Report AMR001). The results are reported below against next available international emission limits for a similar process. The unit was operated strictly in accordance with the manufacturer's operating procedures and was maintained in accordance with standard recommendations.

Pollutant	Average test result (mg/Nm ³)	Emission Limit for Vegetable Drying Processes* (mg/Nm ³)
Particulate matter	4 ± 2	150
Oxides of nitrogen (NO _x)	1 ± 4	200
Sulphur dioxide (SO ₂)	<1	35
Carbon monoxide (CO)	2 ± 4	
Volatile organic compounds (VOCs)	<1	

*Process Guidance Note 6/27 (2005), Department for Environment, Food and Rural Affairs (UK)

Overall, the emission tests conducted under normal roasting conditions indicated what would be considered to be relatively low concentrations of pollutants emitted to atmosphere, certainly below the limits specified for comparable processes. We recommend that operators compare these results against local requirements.

Key considerations:

1. The Air-Motion roaster has an extraction fan and cyclone which continuously removes chaff during the roasting process, separating it from the gas stream before exhausting into atmosphere: therefore low total dust concentrations are expected.
2. The Air-Motion roaster uses electricity instead of the conventional combustion of hydrocarbon-rich fuel for heat generation, therefore low concentration of combustion gases directly emitted from the roaster are also expected.
3. Given the low roasting capacity of the Air-Motion roaster, as well as the use of electricity instead of a hydrocarbon-rich fuel, one would expect low VOC emissions from the roaster. Ambient air is used for cooling and diluting the exiting gas prior to exhausting to atmosphere.

If you have any further questions, please feel free to contact me.

Kind regards,

Loren De Koker
Technical Manager at SKYSIDE
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