

# Study of Carbon Dioxide Release from Roasted Coffee Beans <sup>†</sup>

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**Abstract:** Coffee is one of the world's most popular beverages, with the highest coffee consumptions being found in Europe. During roasting, coffee beans undergo great alterations in their appearance and chemical composition, such as flavor development and gases formation. Among gases formed, carbon dioxide is the most abundant. At the end of the roasting process, a part of it remains trapped inside the pores of the coffee beans and is gradually released during storage or sharply upon grinding. Based on these, this work aimed to investigate the kinetics of CO<sub>2</sub> release from roasted Arabica coffee beans, subjected either to varying degrees of roasting (light, medium, dark) or grinding. The chemical composition (e.g., moisture content, ash, fat, protein, sugars) and morphological characteristics (volume, color, density, size distribution) of both green and roasted coffee beans were also characterized. The coffee beans' composition dramatically changed during the roasting process due to Maillard, caramelization, and pyrolysis reactions. As a result, the color of the bean turned from light green to brown, the characteristic aroma of roasted coffee was formed, while its volume increased considerably. The results of CO<sub>2</sub> release over 7 days revealed that the degassing rate of lightly roasted coffee was inferior than that exhibited by dark and medium roasts. Compared to the whole beans, up to 75% of the trapped gas was released during and immediately after grinding. The results obtained in this work are considered of great importance for the coffee industry since the amount of CO<sub>2</sub> released may affect the packaging and quality of the final product during storage.

**Keywords:** coffee; carbon dioxide; roasting; release.

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## Conflicts of Interest

The authors declare no conflict of interest.