

Determination of sorption isotherms for Shiitake mushroom (*Lentinula edodes*) using the dynamic vapor sorption method

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Introduction

- Shiitake (*Lentinula edodes*) is one of the major edible cultivated mushrooms worldwide.
- Shiitake mushrooms contain a natural chemical compound called ergosterol which, when exposed to ultraviolet (UV) irradiation is converted to vitamin D₂.
- Solar tunnel dryers and cabinet dryers are frequently employed for the post-harvest processing of shiitake mushrooms.
- For the optimization of the drying process and storage, the knowledge of sorption isotherms is essential.
- The objective of this study is to validate the DVS method investigating the moisture sorption behavior of shiitake mushrooms at a temperature of 25 °C and to fit the experimental data to the modified GAB model.

Material and Methods

- *Lentinula edodes*



Fig. 1 Fresh and dried shiitake mushrooms.

- Modified GAB model

$$X_{eq} = \frac{X_m \cdot \left(\frac{C}{T}\right) \cdot K \cdot a_w}{(1 - K \cdot a_w)(1 - K \cdot a_w + \left(\frac{C}{T}\right) \cdot K \cdot a_w)} \quad a_w = \frac{ERH}{100}$$

- The dynamic vapor sorption (DVS) is a technique designed to measure the weight change caused by adsorption or desorption of the water vapor at any desired relative humidity in a short period of time.

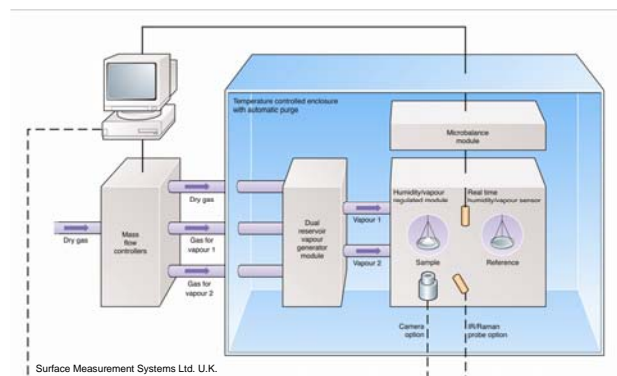


Fig. 2 Schematic diagram of the automated sorption isotherm instrument.

Results

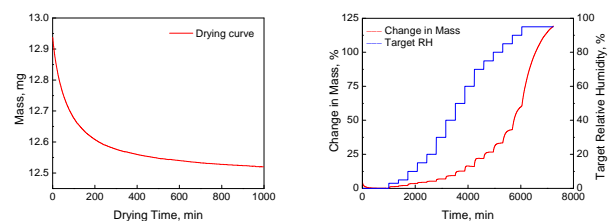


Fig. 3 Drying curve & Equilibrium moisture adsorption profile of shiitake exposed to different values of relative humidity at 25 °C.

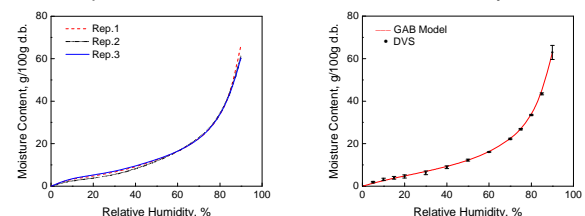


Fig. 4 Repeatability & adsorption isotherms fitted by GAB model.

Conclusions

- The DVS method has been successfully employed for the determination of the sorption isotherms of shiitake mushrooms.
- The GAB model adequately described the sorption characteristics.

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