

## Characteristic of post-consumer wood chips and particles used in particleboard production. Part II.

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**Abstract:** *Characteristic of post-consumer wood chips and particles used in particleboard production. Part II.* The article presents the results of further research aiming at characteristic of post-consumer raw material obtained in industrial conditions, as described in Part I. This part presents the properties of post-consumer wood chips and obtained particles, such as formaldehyde content, pH and buffer capacity of particles. The sand content in tested chips was determined as well. The studies were carried out in comparison to pine wood.

*Keywords:* post-consumer wood, formaldehyde content, pH, buffer capacity, sand content

### INTRODUCTION

Continuous technological progress in the field of wood-based materials has to respond to changing factors such as availability of raw materials base, changing customer expectations, requirements of the standards, activity of competition, and, above all, economic considerations.

These factors, as well as deficit of wood, the resources of which has been decreasing at a global scale, while at the same time demand for articles produced from wood increases, draw attention to post-consumer wood as a raw material for the production of wood-based panels. Rational use of alternative raw materials is one of the basic conditions of sustainable development.

The aim of the study presented in this article was to determine the following properties of post-consumer wood chips and particles obtained from them in laboratory conditions: formaldehyde content, pH, buffer capacity, and sand content.

### MATERIALS AND METHODS

Post-consumer wood chips obtained in industrial conditions were used for the research, as described in Part I.

#### *Buffer capacity, pH of wood*

Alkaline buffer capacity was determined at 100°C. Aqueous extracts of 8/1 mm particle fraction (previously dried to a constant weight) were prepared at a ratio of 25 g particles per 250 mL of water. The particles were boiled under reflux for 30 minutes, then separated from the extracts on a Büchner funnel with filter paper using a vacuum pump. 50 mL of the extract was transferred by pipette to a 100 mL beaker. Next potentiometric titration was performed using 0.025N sulphuric acid as a titrant, achieving pH 3,0. pH of particle aqueous extracts at 20°C was determined. Two aqueous extracts within each portion of raw material were prepared. Determinations were carried out three times and the results were averaged.

#### *Formaldehyde content*

Determination of formaldehyde content was performed by the perforator method according to PN EN 120:1994 standard. The formaldehyde content was tested at 15.1% moisture content for chips, and 8% and about 1% moisture content for particles.

### *Sand content*

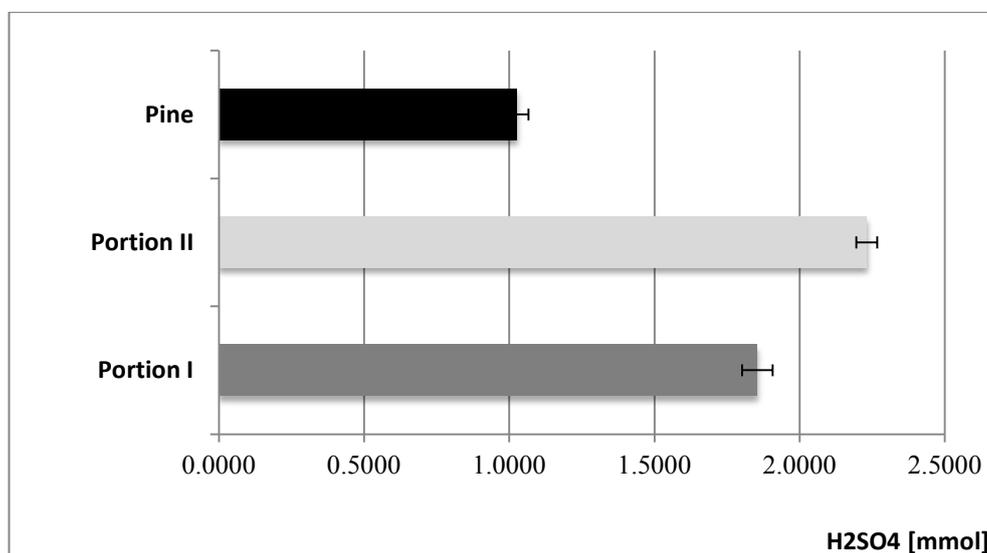
Sand content was determined according to ISO 3340:1976 standard. The standard was applied for both post-consumer wood chips and pine chips.

All tests were performed in comparison to pine sawmill chips from wood in bark and particles obtained from them. Determinations were carried out three times and the results were averaged.

## RESULTS AND DISCUSSION

The alkaline buffer capacity of the particles obtained from post-consumer wood chips was determined according to the methodology described by Frąckowiak [1999].

The studies proved (Fig.1) that the alkaline buffer capacity of the post-consumer wood was almost twice as high as the alkaline buffer capacity corresponding to pine wood. This is a typical feature of hardwood. The differences between the buffer capacities of pine and post-consumer wood could result from the content of broadleaved species in post-consumer wood chips. They can also influence the properties of particleboards based on post-consumer wood.



**Fig. 1** Alkaline buffer capacity

The differences in pH of wood between the particles obtained from post-consumer wood and pine wood were also observed and equalled 5.88; 5.76; 4.69, respectively, for portion I, II and pine.

The results of the research indicated slight differences in the formaldehyde content in tested chips, as well as wet and dry particles, between both the particular portions and pine wood (Fig.2). The different levels of moisture content in tested post-consumer wood and pine wood can influence this result.

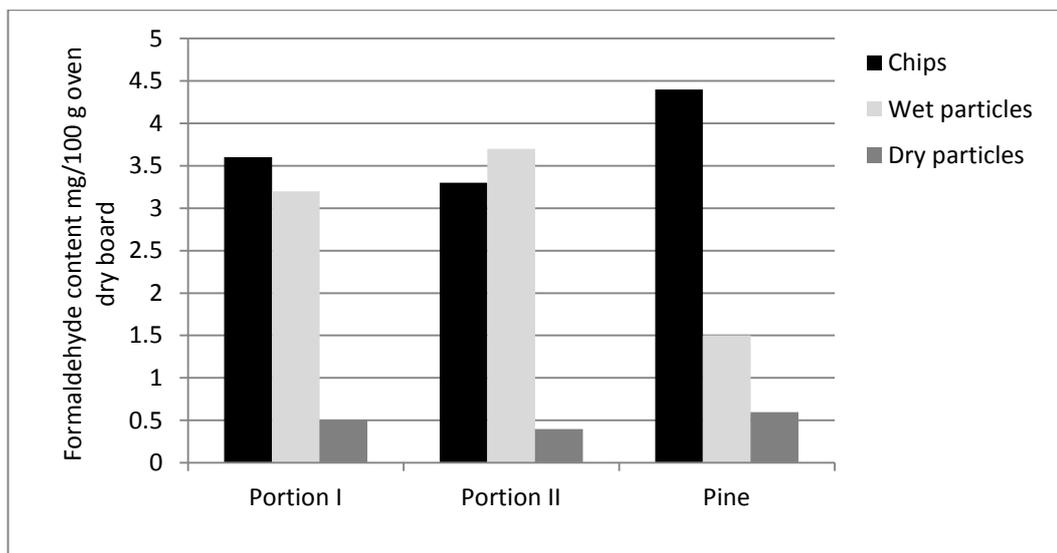


Fig. 2 Formaldehyde content

The content of mineral substances, insoluble in concentrated  $H_2SO_4$  acid, for both tested portions of post-consumer wood was also determined according to ISO 3340:1976 standard. The results showed a relatively low mineral substances content equalling 0.21% and 0.14%, respectively, for portion I and II. Pine chips were characterised by a higher content of mineral substances equalling 0.32% (Fig.3).

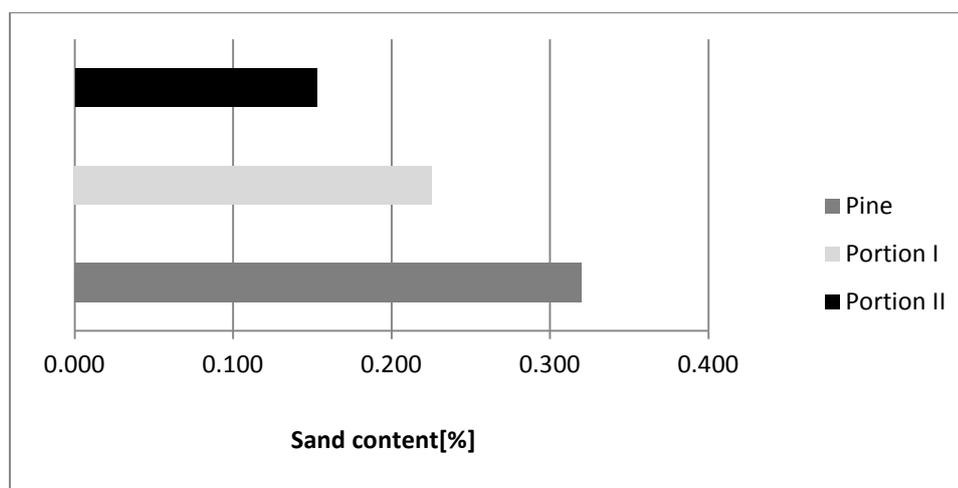


Fig. 3 Sand content

## CONCLUSIONS

The research revealed differences in tested properties of post-consumer wood and pine wood. The alkaline buffer capacity of post-consumer wood was almost twice as high as the alkaline buffer capacity corresponding to pine wood, which could be caused by the content of broadleaved species in post-consumer wood chips. Post-consumer wood chips were characterised by a low content of mineral substances and a lower formaldehyde content in comparison to pine chips.

The results indicate that it is worthwhile to continue research using a large amount of post-consumer wood obtained from various sources.

## REFERENCES

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**Streszczenie:** *Charakterystyka zrębków z drewna użytkowego wykorzystywanego w produkcji płyt wiórowych oraz pozyskanych z nich wiórów. Część II.* W artykule przedstawiono wyniki badań właściwości zrębków z drewna użytkowego z krajowych zasobów przemysłowych oraz pozyskanych z nich wiórów. Oznaczono zawartość formaldehydu, pH oraz pojemność buforową wiórów. Wykonano również oznaczenie zawartości piasku w badanych zrębkach. Badania przeprowadzono w odniesieniu do drewna sosny.

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