Tomas Bata University in Zlín
Faculty of Technology

Vavrečkova 5669
760 01 Zlín

External examiner's review of a Master's thesis

Student's name and surname:	**BSc. Mohammad Shaqib Saifi**
Degree programme:	N0722A130002 Polymer Engineering
Degree course:	
Specialization (if the degree course is divided into specializations):	
Department:	Polymer Engineering
Supervisor of the Master's thesis:	Ing. Martin Stěnička, Ph.D.
External examiner of the Master's thesis:	Ing. Petr Zádrapa, Ph.D.
Academic year:	2023/2024

Title of the Master's thesis:

Optimization of Process of Sieve Analysis of Rubber Waste for Preparation of Active Rubber Particles

Assessment of the Master's thesis using the ECTS grading scale:

	Assessment criteria	Assessment according to the ECTS
1.	Fulfilment of the assignment criteria	**C – Good**
2.	Level of quality of the formal aspects of the thesis, including the level of linguistic quality	**C – Good**
3.	Amount, topicality and relevance of the literature sources consulted	**B – Very good**
4.	Description of experiments and implementation methods	**D – Satisfactory**
5.	Level of quality of processing of the results	**D – Satisfactory**
6.	Interpretation of the results achieved and discussion thereof	**D – Satisfactory**
7.	Formulation of the conclusion of the thesis	**D – Satisfactory**

I recommend the submitted thesis for defence and propose the following assessment:

D – Satisfactory

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Comments on the Master's thesis:

The presented master thesis is focused on the area of rubber waste recycling, which is actually under great interest.

The theoretical part concentrates on the description of rubber recycling, in the chapters called "Uses of recycled rubber", "Recycling of rubber", "Methodology of the recycling" and Techniques for recycling rubber". Unfortunately, the first chapter describes only rubber types instead of a description of recycled rubber utilization. The text flow and the structure of the next chapters are also unclear. The text is focused only on tyre waste processing using grinding, devulcanization and reclaimed rubber process. I am missing information about waste from another source and its utilization. Moreover, the rubber treating processes should be described in more detail. In the fact that 66 literature sources are cited, the topic potential is not utilized sufficiently.

The goal of the practical part was to separate rubber powder using sieving processes and characterize sieved fractions. In the beginning, the work is focused on the correct sieved amount of the rubber powder and the duration of the analysis. Next, the modification (drying and acetone extraction) of the particle surface is applied to reduce surface activity from the reason to increase the amount of the small particle size fraction. Finally, the composition of rubber particles is studied by FTIR, TGA and optical microscopy.

Unfortunately, this part has several imperfections in the methodology description, measurement process, evaluation of the data and conclusion deduction.

Despite these imperfections, I recommend the master thesis to the defence.

Questions to be asked by the external examiner of the Master's thesis:

Could you explain in more detail Horik's theory?

Could you explain the devulcanization using supercritical carbon dioxide?

TGA curves show several peaks in dependence on the degradation of some rubber components. What exactly degrades up to 300 °C? Is it really only wax?

In Zlínn on **24. 05. 2024**

Signature of the external examiner of the Master's thesis