



Treatment and processing of construction industrial- and glass wastes

**MŰSZAKI FÖLDTUDOMÁNYI KAR MSc KÉPZÉS
(nappali munkarendben)**

TANTÁRGYI KOMMUNIKÁCIÓS DOSSZIÉ

**MISKOLCI EGYETEM
MŰSZAKI FÖLDTUDOMÁNYI KAR
NYERSANYAGELŐKÉSZÍTÉSI ÉS KÖRNYEZETI ELJÁRÁSTECHNIKAI INTÉZET**

Ajánlott félév:2. félév

Tartalomjegyzék

1. Tantárgyleírás, tárgyjegyző, óraszám, kreditérték
2. Tantárgytematika (óraóra lebontva)
3. Minta zárthelyi
4. Vizsgakérdések
5. Egyéb követelmények

1. TANTÁRGYLEÍRÁS

Course Title: Treatment and processing of construction industrial- and glass wastes		Credits: 3												
Type of course: compulsory/elective	Neptun code: MFEET720017													
Type (lec. / sem. / lab. / consult.) and Number of Contact Hours per Week: 1 lec. + 1 sem.														
<p>Type of Assessment (exam. / pr. mark. / other): exam. Students will be assessed with using the following elements. Attendance: 5 % Homework: 10 % Short quizzes: 10 % Midterm exam: 40 % Final exam: 35 % Total: 100% Grading scale:</p> <table border="0"> <thead> <tr> <th>% value</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90 -100%</td> <td>5 (excellent)</td> </tr> <tr> <td>80 – 89%</td> <td>4 (good)</td> </tr> <tr> <td>70 - 79%</td> <td>3 (satisfactory)</td> </tr> <tr> <td>60 - 69%</td> <td>2 (pass)</td> </tr> <tr> <td>0 - 59%</td> <td>1 (failed)</td> </tr> </tbody> </table>			% value	Grade	90 -100%	5 (excellent)	80 – 89%	4 (good)	70 - 79%	3 (satisfactory)	60 - 69%	2 (pass)	0 - 59%	1 (failed)
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60 - 69%	2 (pass)													
0 - 59%	1 (failed)													
Position in Curriculum (which semester): 2nd														
Pre-requisites (<i>if any</i>):														
Course Description:														
<p>Acquired store of learning: The aim of the subject for students is to learn knowledge about the treatment and processing of construction industrial- and glass wastes. <i>Construction industry wastes' types, their generation. Their fundamental process engineering and chemical properties, international experience of their utilization in the road construction. Process engineering technologies. General utilization possibilities.</i> <i>Main types, properties, generation of glass wastes. Types, composition and properties of glass, with special regards to the process engineering, mechanical and chemical characteristics. Utilization. Preparation technologies. Recovery of valuable components. Mechanical and thermal processes. Quality control methods.</i></p>														
The 3-5 most important compulsory, or recommended literature (textbook, book) resources:														
<ul style="list-style-type: none"> • Jorge de Brito, Nabajyoti Saikia: Recycled Aggregate in Concrete: Use of Industrial, Construction and Demolition Waste (Green Energy and Technology) Springer 2013. • Csőke B.: Építési Hulladékok előkészítése és hasznosítása. Környezetvédelmi Füzetek. OMIKK (ISBN 963 593 414 9, ISSN 0866-6091), 1999./19 • Gabor Mucsi, Barnabas Csőke, Mark Kertész, Laszlo Hoffmann: Physical Characteristics and Technology of Glass Foam from Waste Cathode Ray Tube Glass. JOURNAL OF MATERIALS 2013:pp. 1-11. (2013) • Gábor Mucsi, Barnabás Csőke: Power plant fly ash as a valuable raw material. Journal of Geosciences and Engineering Published by The Faculty of Earth Science and Engineering Miskolc University, Vol. 1. • Joseph Davidovits: Geopolymer Chemistry and Applications. Institut Geopolymer, 2008. (Second edition) ISBN: 9782951482012 														

Competencies to evolve:

T1 – The environmental engineer knows, and apply the scientific and technical theory, and practice.

K1 – The environmental engineer is able to apply the acquired general, specific rules, contexts, processes, and principles of mathematical-, natural-, and social sciences.

Active professional English language skills.

Responsible Instructor (*name, position, scientific degree*):**Gábor Mucsi Dr., associate professor, PhD****Other Faculty Member(s) Involved in Teaching**, if any (*name, position, scientific degree*):

Roland Szabó, scientific researcher

2. TANTÁRGYTEMATIKA

Treatment and processing of construction industrial- and glass wastes

Tantárgytematika (ÜTEMTERV)

Aktuális tanév tavaszi félév

Környezetmérnök MSc, 2. félév, törzsanyag tárgya

Hét	Előadás
1	Introduction. Requirement of the subject.
2	Construction industry wastes' types, their generation.
3	Construction and Demolition Waste (CDW) fundamental process engineering and chemical properties.
4	International experience of their utilization in the road construction. Case studies.
5	Process engineering technologies. General utilization possibilities.
6	Plant visit 1
7	Main types, properties, generation of glass wastes.
8	Types, composition and properties of glass, with special regards to the process engineering, mechanical and chemical characteristics.
9	Utilization and preparation technologies. Recovery of valuable components.
10	Mechanical and thermal processes of glass waste. Quality control methods.
11	Plant visit 2
12	Overview of other related silicate bearing waste.
13	Combined utilization of various waste types. Synergetic effect of different properties.
14	Consultation

Hét	Gyakorlat
1	Introduction of the practice. Behaviour on the practice.
2	Measurement of Particle Size Distribution (PSD) by laser particle size analyzer.
3	Measurement of specific surface area by Blaine-method.
4	Density determination of solid matter by pycnometer.
5	Crushing tests using jaw crusher and roller crusher.
6	Determination of particle size distribution of the crushed material by sieving and evaluation of the results.
7	Grinding test with tumbling ball mill.
8	Determination of particle size distribution of the ground material by laser scattering and evaluation of the results.
9	Investigation of Hydraulic activity of construction and demolition wastes (CDW)
10	Calculation of the results of CaO adsorption test.
11	Geopolymer production from CDW.
12	Measurement of CDW based geopolymer properties.
13	Glass foam production from waste glass.
14	Measurement of glass waste based glass foam properties.

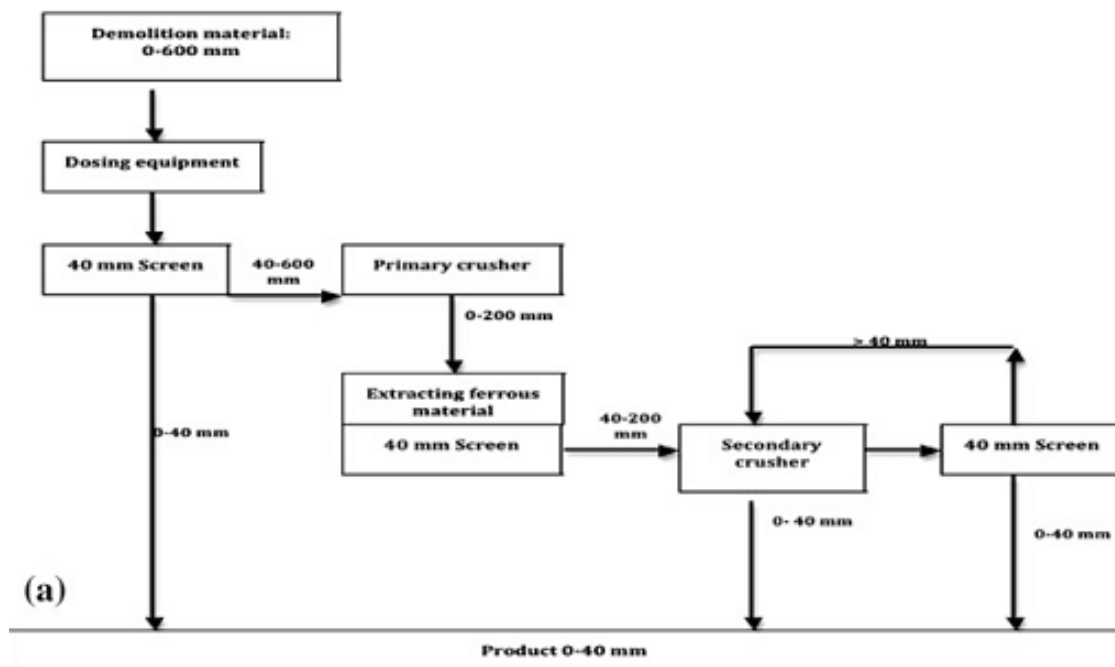
3. MINTA ZÁRTHELYI ÉS A MINTA ZH MEGOLDÁSA

Treatment and processing of construction industrial- and glass wastes

Written Examination

1. Prepare a drawing about a general CDW processing technology with giving the main machines!

15 p

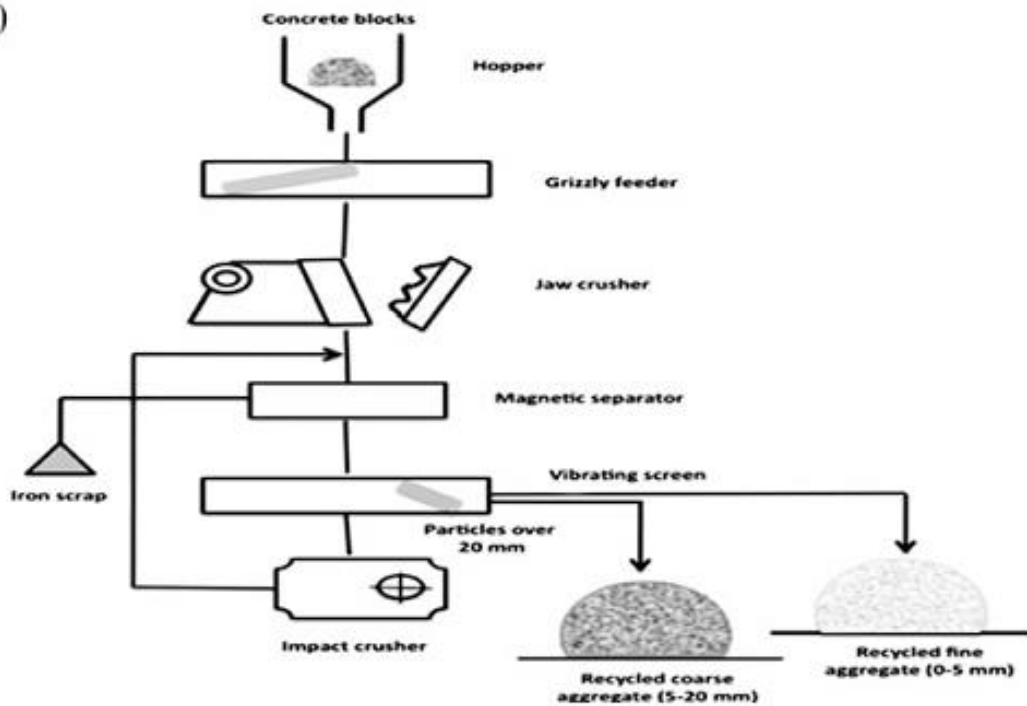


Primary crusher in order to size reduction from meter size down to 100...200 mm max particle size. It might be jaw crusher or impact crusher in fixed or even in mobile version.

Secondary crusher in order to size reduction down to 40 mm max particle size. It might be impact crusher.

Screen is necessary to classify the material into size fractions for the market. It is basically vibration screen.

(b)



Magnetic separator is used for separating iron from the scrap.

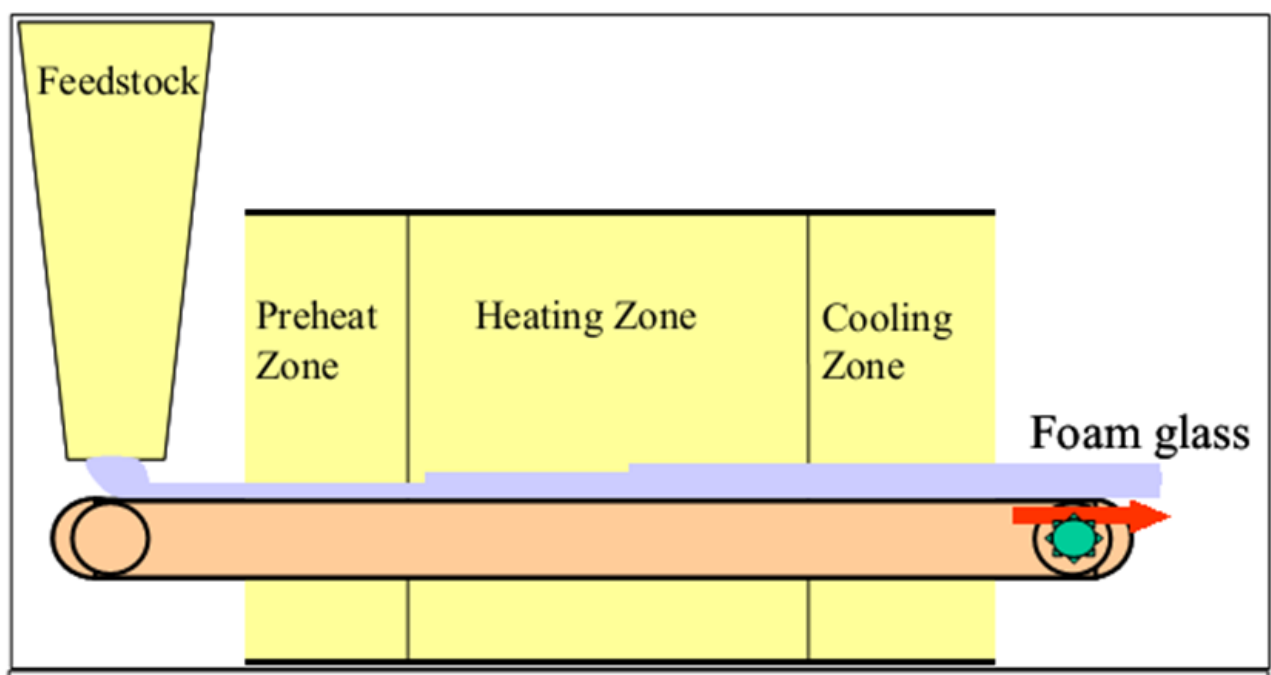
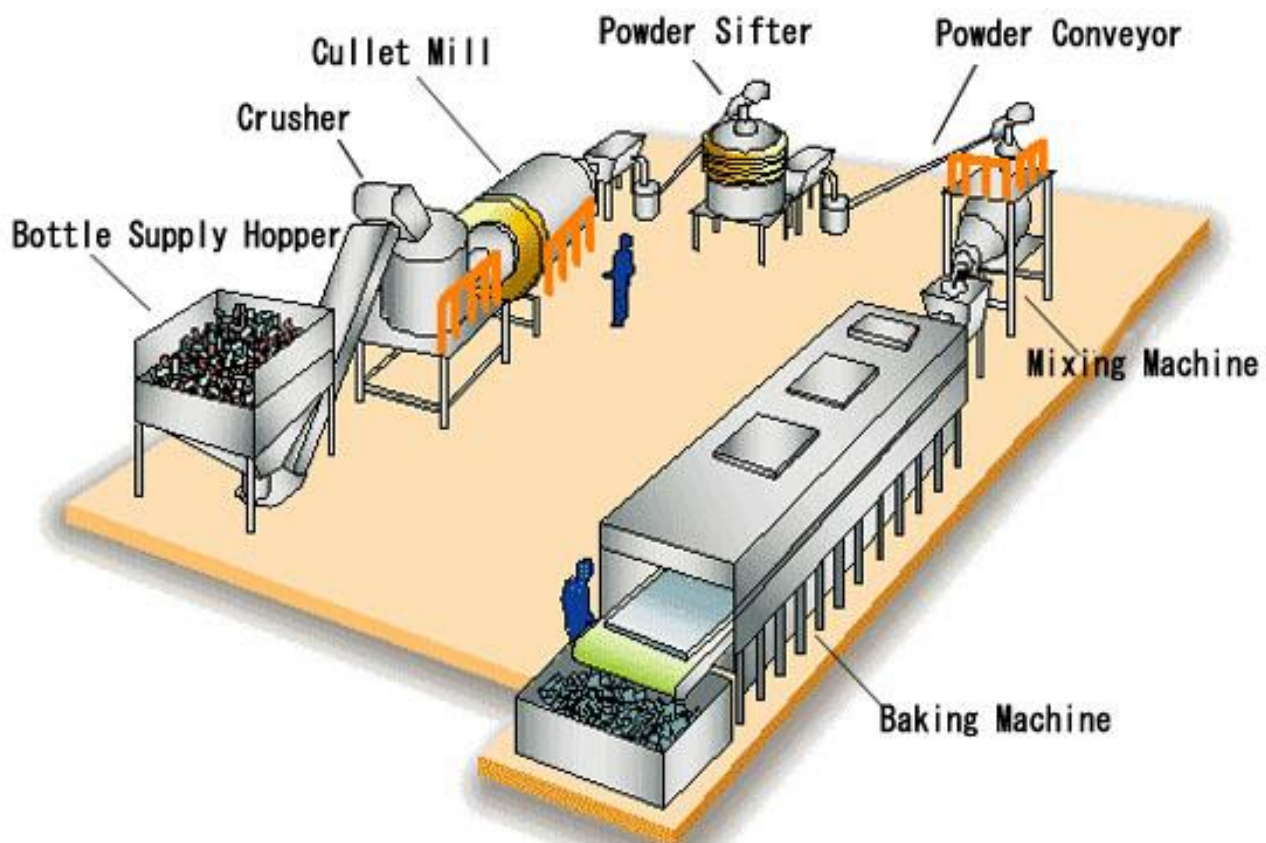
2. Please describe a selected glass waste processing technology. 15 p

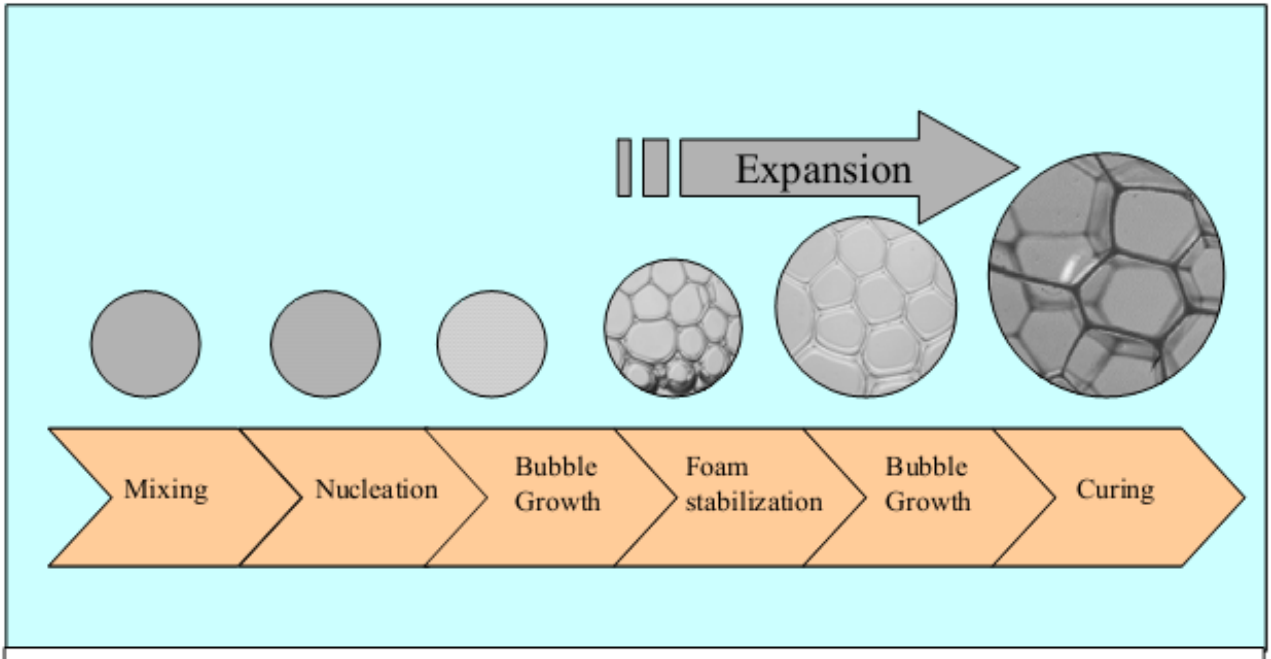
Raw materials:

- Bottle glass,
- window glass,
- cathode ray tube glass (lead contamination).

Main steps of the technology:

- crushing using impact crusher to size reduction down to 10...20 mm,
- grinding to reach particle size under 100 micron by ball mill,
- mixing for homogenization of the raw materials with turbo mixer,
- sintering in order to create foam structure using conveyor machine.





4. VIZSGAKÉRDÉSEK

Vizsgatételek **Treatment and processing of construction industrial- and glass wastes** c. tantárgyból

1	Prepare a drawing about a general CDW processing technology with giving the main machines!
2	Please describe the types of Construction and Demolition Wastes (CDW)!
3	Please provide the main parameters of glass wastes and types!
4	Please describe a selected glass waste processing technology!
5	What kind of utilization possibilities of CDW do you know?
6	How to determine the main physical and chemical properties of CDW?
7	How to determine the main physical and chemical properties of glass waste?
8	What kind of contaminations of CDW do you know?
9	Please explain the working principle of jaw crusher! Provide drawing!
10	Please explain the working principle of impact crusher! Provide drawing!
11	Please explain the working principle of gyratory crusher! Provide drawing!

5. EGYÉB KÖVETELMÉNYEK

A vizsga zárthelyi dolgozat írása közben a mobiltelefon használata tilos!

Miskolc, 2018. június.10.

Dr. Nagy Sándor
Intézetigazgató egyetemi docens

Dr. Mucsi Gábor
egyetemi docens