Response to Reviewer 1 Comments

We thank the respected reviewer for the careful and thorough review of the manuscript and constructive comments and suggestions provided.

The followings are the explanations and the implemented corrections in response to the reviewer's comments.

- Edited texts were highlighted with green colour in the revised manuscript.

Reviewer #1: Dear authors,

I have read the manuscript "Deformation Characteristics of Rubber Waste Powder-Clay Mixtures." This study provides valuable information for researchers interested in how geotechnical properties of soil change when modified with wastes; however, I have some comments the authors should consider before publishing their research.

Comment. Page 4, Figure 2, consider changing the legend "posisition" by "diffraction angle (degrees)" or "2θ (degrees)."

Answer:
As recommended by the reviewer, in Figure 2 the legend "position" has been changed by "diffraction angle (degrees)".

Comment. Page 5, Table 2, why the chemical composition of CS does not sum 100%? Change "AL2O3" by "Al2O3" and "Cao" by "CaO"

Answer:
The value of the parameter L.O.I. About 2 was written. Its exact value which is equal to 2.5 and was replaced in the table, and the percentage of compounds is equal to 100%. As recommended by the reviewer, "AL2O3" and "Cao" have been changed by "Al2O3" and "CaO".

Comment. Can the authors provide more details about the methodology used for the XRD and XRF measurements, e.g., example model of the equipment, PDFs used to determine the mineralogical composition of the soil, chemical solutions used for device calibration, detection limits of the devices, quality assurance of the measurements, etc.? It is unclear how this information affects the experiments; please, clarify it.

Answer:

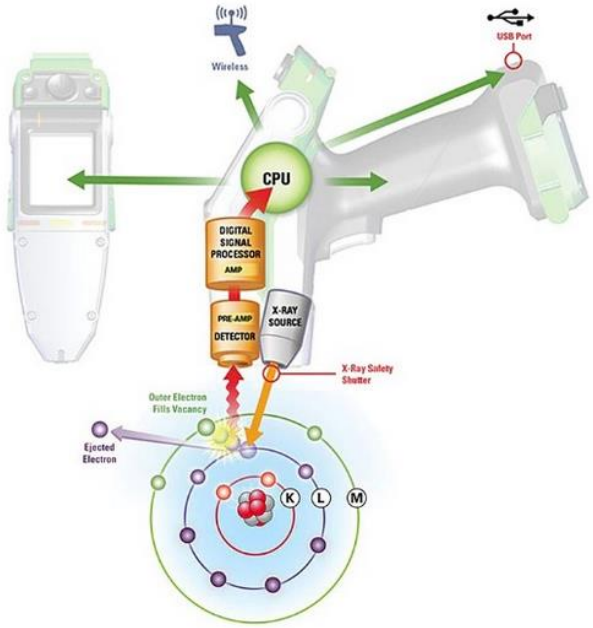
XRD and XRF tests were carried out in the mining faculty of Amirkabir University of Technology and according to conventional methods. It is mentioned in the manuscript. To provide more information about these tests, explanations are provided for the honorable reviewer:

The knowledge related to these tests is related to the science of mining engineering and chemical engineering. We have only used the results of the experiments. The amount of 50 grams of the materials used in this research were sent to the laboratory and its results were prepared for us.
These tests are special tests, explanations about these tests are provided for reviewer:

XRF analysis:

XRF stands for X-ray fluorescence. The XRF analysis process works based on the displacement of an atom's electrons in its orbitals and the release of energy. The intensity and amount of this energy is different for each element and is known as the characteristic of that element.
XRF analysis is an analytical method for determining the chemical composition. The desired substance can be solid, liquid, powder, filtered or any other form.
In XRF analysis, X-rays are generated by a source and radiated to the sample. In most cases, the source is an X-ray tube, but sometimes a synchrotron or a radioactive material is used as a source. The elements in the X-ray sample emit fluorescence with discrete energy (in the form of light), which is specific to each element and part of its properties.
Performance of the XRF process:

1- High-energy X-rays are emitted from an X-ray tube into a sample (solid or liquid).
2- If the energy of X-ray radiation is higher than the binding energy of the electrons of the K and L layers, the atom will be removed from these layers.
3- In order for the atom to return to its previous stable state, electrons are transferred from the higher energy level to the created hole.
4- As a result of electron transfer from high energy level to low energy level, X-ray energy with specific wavelength is released. Measuring the energy of this radiation is the basis of XRF analysis.





In the following reference, comprehensive information is provided in this regard

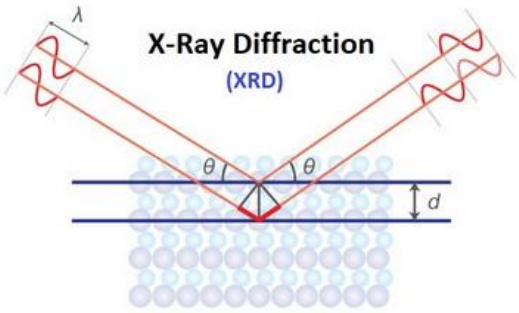
- https://www.chem.bg.ac.rs/~grzetic/predavanja/Nedestruktivna%20hemijska%20analiza%20-%20odabrana%20poglavlja/XRF/Literature/PANanalytical%20XRF%20theory.pdf

XRD analysis:

This technique is a very fast and analytical method used to identify the phase of a crystalline material. Today, the above technique is one of the common methods for studying crystal structures and atomic distance. This technique, which is called XRD for short, was first discovered by Max von Laue in 1912. X-rays are produced by a cathode ray tube (by bombarding the target sample). These rays are then filtered to produce monochromatic rays and directed to the sample.

The interaction of the incident rays with the main sample causes a constructive collision and establishes Bragg's law. ($n\lambda=2d \sin \theta$). This law relates the wavelength of electromagnetic radiation to the diffraction angle and lattice spacing in a crystalline sample. These scattered X-rays are then detected, processed and counted. The peaks obtained at 2θ angle can help to identify the elements in the composition. It is necessary to know that each mineral has a set of unique d distances and by converting the diffraction peaks to d distances, it is possible to identify each mineral and each material has its own XRD spectrum and scatters the emitted X-rays according to a specific pattern. As a result, this spectrum is like a fingerprint for each substance and it is not possible for the spectrum of two substances to be similar.

For each chemical compound or mineral with a specific crystal structure, there is a standard card that is used for identify compound or mineral.



In the following references, comprehensive information is provided in this regard

- X-ray Powder Diffraction (XRD). (2019, April 5). Retrieved December 28, 2019, from https://serc.carleton.edu/research_education/geochemsheets/techniques/XRD.html.
- https://www.iitk.ac.in/che/pdf/resources/XRD-reading-material.pdf

Comment. Page 5, the Authors should state if the data reported in Table 2 were determined by punctual analysis or by duplicate/triplicate and indicate the corresponding standard deviation. Also, the authors should state if the experiments reported in Table 3 were performed in duplicate/triplicate and show the corresponding standard deviation bars in the corresponding Figures.

Answer:

Table 2: Considering the importance of knowing the materials properties used in this study (1-clay soil, 2-rubber powder), the related information presented in Table 2.

In order to achieve the information of this table, various tests have been performed for one clay sample (CS) and the obtained information is presented in the table. Also, some rubber (RWP) has been tested to provide information about the properties of the rubber. Considering that one type of soil and one type of rubber have been tested, it seems that providing statistical information is not required.
Table 3: this table presents the different combinations of soil and rubber and the tests performed on each combination. One test was performed for each combination. Therefore, it seems that providing statistical information is not required.

Comment. Page 5, Line 152, "Figure 4a display waste tires and WRPs and…" change "WRPs" by "RWPs"

Answer:
As recommended by the reviewer, "WRPs" has been changed by "RWPs"

Comment. Page 11, Figure 8, change "KN/m3" by "kN/m^3"

Answer:
As recommended by the reviewer, in figure 8, "KN/m3" has been changed by "kN/m^3"

Comment. From Figure 9 to Figure 13, the legend "Pressure (KPa)" must be "Pressure (kPa)" since the prefix kilo in the International System of Units is in lowercase

Answer:
As recommended by the reviewer, From Figure 9 to Figure 13, the legend "Pressure (KPa)" has been changed to "Pressure (kPa)"

Comment. Figure 10 and Figure 13, the legend "Rubber content, %" should be "Rubber content (%)" for homogeneity with the other Figures in the manuscript

Answer:
As recommended by the reviewer, in Figure 10 and Figure 13, the legend "Rubber content, %" have been changed to "Rubber content (%)"

Comment. Figures 14a and 14b, check the legends of the graphs.

Answer:
As recommended by the reviewer, in Figures 14a and 14b the legends has been checked.

Comment. Page 18, "4. Remarkable points" section, to avoid distracting the reader's attention, authors should consider presenting the information of this section where they discussed the corresponding results for the first time.

Answer:
As recommended by the reviewer, "4. Remarkable points" section was removed and the information of this section has been presented where they discussed the corresponding results for the first time. Considering that this section was the result of the previous research of the authors of the article in this field, most of its information was transferred to the "Introduction" section.

Comment. Page 19-20, “5. Conclusions” section. The authors should rewrite this section by concentrating on the significant findings revealed by their study in six parts.

Answer:

As recommended by the reviewer, “Conclusions” section has been rewritten and only significant findings has been presented revealed by this study and summarized.

Other changes to the manuscript carried out by authors to improve article quality are as follows:

- According to the respected reviewer's comments, it is not recommended regarding the quality of writing the article. In order to more improve the quality of the article, native editing has been done.
- The quality of the figures (Figure 1, Figure 2, Figure 3, Figure 12, and Figure 14) is improved as much as possible.