An experimental study of the influence of lithology on compaction behaviour of broken waste rock in coal mine backfill

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Revised submission: 25 February 2019
Final acceptance: 11 March 2019

Note: Reports are unedited and appear as submitted by the referee. The review history appears in chronological order.

Review History
RSOS-182205.R0 (Original submission)

Review form: Reviewer 1

Is the manuscript scientifically sound in its present form?
Yes

Are the interpretations and conclusions justified by the results?
Yes

Is the language acceptable?
No

Is it clear how to access all supporting data?
Not Applicable

Do you have any ethical concerns with this paper?
No
Have you any concerns about statistical analyses in this paper?
No

Recommendation?
Accept with minor revision (please list in comments)

Comments to the Author(s)
The manuscript is easy to follow and has an appropriate structure. It is an interesting experimental study and might have applications in the coal mine environmental protection. However, there are some contents needing to be modified to improve the quality of the manuscript. Therefore, I suggest a minor revision before the manuscript could be accepted for publication. The following suggestions and comments should be considered when revising the manuscript.

Specific Comments:
No.1: the compaction of crushed waste rock was the main focus of this study, which is the main method to quantify the compaction process.
No.2: The lateral pressure applied was 2 MPa. Why the authors set the values for the lateral pressure and loading cycle?
No.3: Page 6 line 15, add an introductory sentence, before start describing the steps.
No.4: Figure 2 is similar to Figure 3. The authors should consider to merge into one figure.
No.5: In section 4, comparing Equations (1), (3), (4) and (5), it results that $h=H_h$ and $h==$: why do the authors use different symbols for the same dimensions?
No. 6: Page 10 line 33, the authors should provide a formula defining the lateral pressure coefficient, please clarify.
No. 7: In the introduction and in the conclusions, greater emphasis must be placed on the fields of application of this research, not only about the experiment.

Review form: Reviewer 2

Is the manuscript scientifically sound in its present form?
Yes

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Yes

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Yes

Is it clear how to access all supporting data?
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Do you have any ethical concerns with this paper?
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Have you any concerns about statistical analyses in this paper?
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Recommendation?
Accept with minor revision (please list in comments)
Comments to the Author(s)
In this paper, a self-made bidirectional test system is used to test effects of lithology on compaction behaviors of waste rocks, which will provide the lithology selection for the backfill materials. Meanwhile, the research results will be helpful to reduce the pollutions in mine areas. The paper is interesting and is worthy of consideration for publication in the RSOS. However, many details are missing. The reviewer has some minor corrections or comments that the authors need to address to improve the quality of the paper.
According to the contents of sample preparation and test scheme, the waste rock sample is not belonging to coal gangue, which kind of the waste rock is used as the samples?
If this size of the loading box is enough for waste rock samples, please add the explanation.
Figure 4 is not necessary. The test steps have been stated in the main text. It should be deleted.
Page 6: line 23-24, after placing each layer, the rock blocks were pre-compacted until all layers were loaded. Not very clear. Please, rephrase or explain a bit better.
Page 10: line 32-34, by the term lateral pressure coefficient you mean the ratio of horizontal to vertical stresses?
Porosity usually represents the ratio between the volume of void and the total volume of a given material, containing also this void. On the other hand, $h$ and $\ell$ in Equations (4) and (7) represent something similar to the volumetric strain ($-\ell$/), which is the ratio between the variation of volume and the original volume.

Decision letter (RSOS-182205.R0)

18-Feb-2019

Dear Professor Zhang,

The editors assigned to your paper ("An experimental study of the influences of lithology on compaction behaviours of broken waste rocks in coal mine backfilling") have now received comments from reviewers. We would like you to revise your paper in accordance with the referee and Associate Editor suggestions which can be found below (not including confidential reports to the Editor). Please note this decision does not guarantee eventual acceptance.

Please submit a copy of your revised paper before 13-Mar-2019. Please note that the revision deadline will expire at 00.00am on this date. If we do not hear from you within this time then it will be assumed that the paper has been withdrawn. In exceptional circumstances, extensions may be possible if agreed with the Editorial Office in advance. We do not allow multiple rounds of revision so we urge you to make every effort to fully address all of the comments at this stage. If deemed necessary by the Editors, your manuscript will be sent back to one or more of the original reviewers for assessment. If the original reviewers are not available, we may invite new reviewers.

To revise your manuscript, log into http://mc.manuscriptcentral.com/rsos and enter your Author Centre, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision. Revise your manuscript and upload a new version through your Author Centre.

When submitting your revised manuscript, you must respond to the comments made by the referees and upload a file "Response to Referees" in "Section 6 - File Upload". Please use this to
document how you have responded to the comments, and the adjustments you have made. In order to expedite the processing of the revised manuscript, please be as specific as possible in your response.

In addition to addressing all of the reviewers' and editor's comments please also ensure that your revised manuscript contains the following sections as appropriate before the reference list:

• Ethics statement (if applicable)
If your study uses humans or animals please include details of the ethical approval received, including the name of the committee that granted approval. For human studies please also detail whether informed consent was obtained. For field studies on animals please include details of all permissions, licences and/or approvals granted to carry out the fieldwork.

• Data accessibility
It is a condition of publication that all supporting data are made available either as supplementary information or preferably in a suitable permanent repository. The data accessibility section should state where the article’s supporting data can be accessed. This section should also include details, where possible of where to access other relevant research materials such as statistical tools, protocols, software etc can be accessed. If the data have been deposited in an external repository this section should list the database, accession number and link to the DOI for all data from the article that have been made publicly available. Data sets that have been deposited in an external repository and have a DOI should also be appropriately cited in the manuscript and included in the reference list.

If you wish to submit your supporting data or code to Dryad (http://datadryad.org/), or modify your current submission to dryad, please use the following link: http://datadryad.org/submit?journalID=RSOS&manu=RSOS-182205

• Competing interests
Please declare any financial or non-financial competing interests, or state that you have no competing interests.

• Authors’ contributions
All submissions, other than those with a single author, must include an Authors’ Contributions section which individually lists the specific contribution of each author. The list of Authors should meet all of the following criteria; 1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published.

All contributors who do not meet all of these criteria should be included in the acknowledgements.

We suggest the following format:
AB carried out the molecular lab work, participated in data analysis, carried out sequence alignments, participated in the design of the study and drafted the manuscript; CD carried out the statistical analyses; EF collected field data; GH conceived of the study, designed the study, coordinated the study and helped draft the manuscript. All authors gave final approval for publication.

• Acknowledgements
Please acknowledge anyone who contributed to the study but did not meet the authorship criteria.
• Funding statement
Please list the source of funding for each author.

Once again, thank you for submitting your manuscript to Royal Society Open Science and I look forward to receiving your revision. If you have any questions at all, please do not hesitate to get in touch.

Kind regards,
Andrew Dunn
Royal Society Open Science Editorial Office
Royal Society Open Science
openscience@royalsociety.org

on behalf of Prof R. Kerry Rowe (Subject Editor)
openscience@royalsociety.org

Associate Editor's comments:
Please revise your manuscript to fully address the reviewers' concerns. They are broadly positive about your work, but we would like you to make sure you do a good job with the revisions (both scientifically and in checking the language in case you can improve its clarity at all).

The reviewers may be asked to assess your changes, so make sure you provide a full point-by-point response in your revision. Good luck!

Comments to Author:

Reviewers' Comments to Author:
Reviewer: 1

Comments to the Author(s)
The manuscript is easy to follow and has an appropriate structure. It is an interesting experimental study and might have applications in the coal mine environmental protection. However, there are some contents needing to be modified to improve the quality of the manuscript. Therefore, I suggest a minor revision before the manuscript could be accepted for publication. The following suggestions and comments should be considered when revising the manuscript.
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No.5: In section 4, comparing Equations (1), (3), (4) and (5), it results that \( h = h_h \) and \( h = h_h \): why do the authors use different symbols for the same dimensions?
No. 6: Page 10 line 33, the authors should provide a formula defining the lateral pressure coefficient, please clarify.
No. 7: In the introduction and in the conclusions, greater emphasis must be placed on the fields of application of this research, not only about the experiment.
Reviewer: 2

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Page 10: line 32-34, by the term lateral pressure coefficient you mean the ratio of horizontal to vertical stresses?
Porosity usually represents the ratio between the volume of void and the total volume of a given material, containing also this void. On the other hand, $h$ and $h$ in Equations (4) and (7) represent something similar to the volumetric strain ($\gamma$), which is the ratio between the variation of volume and the original volume.

Author's Response to Decision Letter for (RSOS-182205.R0)
See Appendix A.

RSOS-182205.R1 (Revision)

Review form: Reviewer 1

Is the manuscript scientifically sound in its present form?
Yes

Are the interpretations and conclusions justified by the results?
Yes

Is the language acceptable?
Yes

Is it clear how to access all supporting data?
Yes

Do you have any ethical concerns with this paper?
No
Review form: Reviewer 2

Is the manuscript scientifically sound in its present form?
Yes

Are the interpretations and conclusions justified by the results?
Yes

Is the language acceptable?
Yes

Is it clear how to access all supporting data?
Not Applicable

Do you have any ethical concerns with this paper?
No

Have you any concerns about statistical analyses in this paper?
No

Recommendation?
Accept as is

Comments to the Author(s)
The manuscript can be published in its present form. Congratulations to the authors.

Decision letter (RSOS-182205.R1)

11-Mar-2019

Dear Professor Zhang,

I am pleased to inform you that your manuscript entitled "An experimental study of the influence of lithology on compaction behaviour of broken waste rock in coal mine backfill" is now accepted for publication in Royal Society Open Science.
You can expect to receive a proof of your article in the near future. Please contact the editorial office (openscience_proofs@royalsociety.org and openscience@royalsociety.org) to let us know if you are likely to be away from e-mail contact. Due to rapid publication and an extremely tight schedule, if comments are not received, your paper may experience a delay in publication.

Royal Society Open Science operates under a continuous publication model (http://bit.ly/cpFAQ). Your article will be published straight into the next open issue and this will be the final version of the paper. As such, it can be cited immediately by other researchers. As the issue version of your paper will be the only version to be published I would advise you to check your proofs thoroughly as changes cannot be made once the paper is published.

On behalf of the Editors of Royal Society Open Science, we look forward to your continued contributions to the Journal.

Kind regards,
Royal Society Open Science Editorial Office
Royal Society Open Science
openscience@royalsociety.org

on behalf of Professor R. Kerry Rowe (Subject Editor)
openscience@royalsociety.org

Associate Editor Comments to Author:
As the reviewers are now satisfied with your manuscript, it may be accepted for publication. Well done on your hard work!

Reviewer comments to Author:
Reviewer: 2

Comments to the Author(s)
The manuscript can be published in its present form. Congratulations to the authors.

Reviewer: 1

Comments to the Author(s)
None

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Read Royal Society Publishing’s blog: https://blogs.royalsociety.org/publishing/
Dear editor and reviewers,

On behalf of my co-authors, we thank you very much for giving us an opportunity to revise our manuscript. We are grateful to the editor and reviewers for their positive and constructive comments and suggestions on our manuscript entitled “An experimental study of the influence of lithology on compaction behaviour of broken waste rock in coal mine backfill” (RSOS-182205). These comments have all been of great help to us in the revision and improvement of our paper, as well as providing significant guidance for our research.

We have revised our manuscript according to the comments from the reviewers and have used a professional language editing service to improve its grammar and writing style. We hope that the manuscript now meets with your approval. The main corrections to the paper and our responses to the reviewers are as follows:

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**Appendix A**

Dear editor and reviewers,

On behalf of my co-authors, we thank you very much for giving us an opportunity to revise our manuscript. We are grateful to the editor and reviewers for their positive and constructive comments and suggestions on our manuscript entitled “An experimental study of the influence of lithology on compaction behaviour of broken waste rock in coal mine backfill” (RSOS-182205). These comments have all been of great help to us in the revision and improvement of our paper, as well as providing significant guidance for our research.

We have revised our manuscript according to the comments from the reviewers and have used a professional language editing service to improve its grammar and writing style. We hope that the manuscript now meets with your approval. The main corrections to the paper and our responses to the reviewers are as follows:
Responds to Reviewer #1

No. 1: The compaction of crushed waste rock was the main focus of this study, which is the main method to quantify the compaction process.

Response: Thank you for your positive comments. The “Method of compaction testing of solid backfilling materials” is used as the testing method for the compaction characteristics of broken waste rocks, which was issued by the China’s National Energy Administration. The authors have added this standard as the reference in the revised manuscript.

No. 2: The lateral pressure applied was 2 MPa. Why the authors set the values for the lateral pressure and loading cycle?

Response: Thank you for your positive comments. The lateral pressure (2 MPa) was set according to the engineering applications.

No. 3: Page 6 line 15, add an introductory sentence, before start describing the steps.

Response: Thank you for your positive comments. The authors have added the introductory sentence.

No. 4: Figure 2 is similar to Figure 3. The authors should consider to merge into one figure.

Response: Thank you for your positive comments. The authors have merged Figure and Figure 3 into one Figure in the revised manuscript.

No. 5: In section 4, comparing Equations (1), (3), (4) and (5), it results that $h_s = h_b$ and $L_b = l_s = l_v$: why do the authors use different symbols for the same dimensions?

Response: Thank you for your positive comments. The authors used different symbols for the different dimensions.

No. 6: Page 10 line 33, the authors should provide a formula defining the lateral pressure coefficient, please clarify.

Response: Thank you for your positive comments. The authors have added the formula in the revised manuscript.
No. 7: In the introduction and in the conclusions, greater emphasis must be placed on the fields of application of this research, not only about the experiment.

Response: Thank you for your positive comments. The authors tried their best to add more detailed information about the fields of application of this paper’s research.

Special thanks to you for your good comments again. They are valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches.
Responds to Reviewer #2

No. 1: According to the contents of sample preparation and test scheme, the waste rock sample is not belonging to coal gangue, which kind of the waste rock is used as the samples?

Response: Thank you for your positive comments. The waste rock produced during tunneling was used as the testing samples.

No. 2: If this size of the loading box is enough for waste rock samples, please add the explanation.

Response: Thank you for your positive comments. The maximum particle size of the waste rock sample is 30mm. And the minimum size of the loading box is 200mm. The ratio of the minimum size of the loading box to the maximum particle size of the waste rock sample is bigger than 6.

No. 3: Figure 4 is not necessary. The test steps have been stated in the main text. It should be deleted.

Response: Thank you for your positive comments. The authors have deleted Figure 4 in the revised manuscript.

No. 4: Page 6: line 23-24, after placing each layer, the rock blocks were pre-compacted until all layers were loaded. Not very clear. Please, rephrase or explain a bit better.

Response: Thank you for your positive comments. The authors have added more information in the revised manuscript about this sentence.

No. 5: Page 10: line 32-34, by the term lateral pressure coefficient you mean the ratio of horizontal to vertical stresses?

Response: Thank you for your positive comments. The lateral pressure coefficient is the ratio of horizontal to vertical stresses. The authors have added one formula in the revised manuscript.

No. 6: Porosity usually represents the ratio between the volume of void and the total
volume of a given material, containing also this void. On the other hand, $\phi_h$ and $\phi_v$ in Equations (4) and (7) represent something similar to the volumetric strain $(V_{final} - V_{initial})/V_{initial}$, which is the ratio between the variation of volume and the original volume.

Response: Thank you for your positive comments. The $\phi_h$ and $\phi_v$ are calculated by Formula (4) and (7), $V_h$ or $V_v$ represents the volume of specimen (broken), the $V_0$ represents the volume of specimen (not broken), $V_h - V_0$ or $V_v - V_0$ represents the volume of void.

Special thanks to you for your good comments again. They are valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches.