**Review report for CJCE-24-0503**

In this manuscript, authors reported the application of a mathematical model for the supercritical extraction process of essential oil from chamomile flowers. Authors pointed out that the applied model describes the governing mass transfer phenomena in a solid-fluid environment under supercritical conditions using carbon dioxide. They mentioned that the flow of carbon dioxide is assumed to be uniform across any cross-section, although the area available for the fluid phase can vary along the extractor. Furthermore, authors remarked that the physical properties of the solvent are estimated based on the Peng-Robinson equation of state. In addition, they also reported that the model parameters, including the partition factor, internal diffusion coefficient and decaying factor, were determined through maximum likelihood estimation based on experimental data assuming normally distributed errors.

In general, the manuscript is very attractive and interesting, as well as beneficial for applied purposes. I strongly recommend it for publishing in the Canadian Journal of Chemical Engineerings. Meanwhile, the manuscript needs a major and substantial revision before its acceptance. I also invite authors to completely and fully address the comments raised here. The comments are explained below.

1. ~~Please explain and highlight the novelties of this research work with respect to the previously published papers, in the manuscript.~~   
   ***Done. See section Results***
2. ~~The motivations of conducting this research work are described.~~  
   ***See second last paragraph of the Introduction chapter. Something to add?***
3. ~~English language of manuscript needs a mild revision throughout the manuscript. For example, in page 9, lines 6 and 12, “the desorptiondissolutiondiffusion”, must be corrected.~~
4. ~~The manuscript title is recommended to be improved as “~~**~~Mathematical modelling of~~****~~essential oil~~** ~~supercritical carbon dioxide extraction~~ **~~from chamomile flowers”~~**~~.~~
5. The provided highlights must be shortened as well as quantitative reported values.
6. ~~The last statement of abstract section is ambiguous. In fact, authors did not perform any experiments. Accordingly, please remove it.~~
7. ~~The last paragraph of introduction must be rewritten, focusing the importance and necessity of this work.~~   
   ***Done. See last paragraph of the Introduction section***
8. ~~As you may know, supercritical fluids such as carbon dioxide (SC-CO~~~~2~~~~) has many applications in various topics. Authors are requested inserting a proper statement to emphasise the importance of the utilizing of SC-CO~~~~2~~ ~~technology to be familiar for readers. For this purpose, write and insert this statement in the introduction section of the main manuscript along with fully cited references in below. “supercritical fluids like supercritical carbon dioxide (SC-CO~~~~2~~~~) has shown a great ability in various fields including extraction of~~ **~~essential oil [~~**

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| [**~~https://doi.org/10.1016/j.supflu.2016.11.014,~~**](https://doi.org/10.1016/j.supflu.2016.11.014) | [**~~https://doi.org/10.1016/j.supflu.2014.07.023,~~**](https://doi.org/10.1016/j.supflu.2014.07.023) |
| [**~~https://doi.org/10.1016/j.supflu.2016.04.006,~~**](https://doi.org/10.1016/j.supflu.2016.04.006,) | [**~~https://doi.org/10.1016/j.supflu.2011.02.002~~**](https://doi.org/10.1016/j.supflu.2011.02.002)**~~,~~** |
| [**~~https://doi.org/10.1016/j.supflu.2016.05.015,~~**](https://doi.org/10.1016/j.supflu.2016.05.015) | [**~~https://doi.org/10.1016/j.supflu.2017.04.007,~~**](https://doi.org/10.1016/j.supflu.2017.04.007) |

[**~~https://doi.org/10.1016/j.jtice.2015.11.003~~**](https://doi.org/10.1016/j.jtice.2015.11.003)**~~, ], seed oil [~~**[**~~https://doi.org/10.1016/j.supflu.2016.08.019,~~**](https://doi.org/10.1016/j.supflu.2016.08.019)[**~~https://doi.org/10.1016/j.supflu.2015.12.004,~~**](https://doi.org/10.1016/j.supflu.2015.12.004)[**~~https://doi.org/10.1016/j.supflu.2017.12.026]~~**](https://doi.org/10.1016/j.supflu.2017.12.026)**~~, solubility [~~**[**~~https://doi.org/10.1002/cben.202200020,~~**](https://doi.org/10.1002/cben.202200020) **~~https://doi.org/10.1007/s11814-018-0125-6],~~**

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| **~~nanoparticle formation~~** | **~~[~~**[**~~https://doi.org/10.1016/j.supflu.2017.10.015,~~**](https://doi.org/10.1016/j.supflu.2017.10.015) |
| [**~~https://doi.org/10.1016/j.heliyon.2020.e04947,~~**](https://doi.org/10.1016/j.heliyon.2020.e04947) | [**~~https://doi.org/10.1016/j.supflu.2021.105163,~~**](https://doi.org/10.1016/j.supflu.2021.105163) |
| [**~~https://doi.org/10.1016/j.jcou.2021.101799~~**](https://doi.org/10.1016/j.jcou.2021.101799)**~~,~~** | [**~~https://doi.org/10.1016/j.supflu.2018.11.007~~**](https://doi.org/10.1016/j.supflu.2018.11.007) |
| [**~~https://doi.org/10.1016/j.cherd.2018.12.020~~**](https://doi.org/10.1016/j.cherd.2018.12.020)**~~,~~** | [**~~https://doi.org/10.1016/j.fluid.2018.11.006~~**](https://doi.org/10.1016/j.fluid.2018.11.006)**~~,~~** |
| [**~~https://doi.org/10.1016/j.supflu.2018.06.009]~~**](https://doi.org/10.1016/j.supflu.2018.06.009)**~~,~~** | **~~impregnation~~** |
| **~~[~~**[**~~https://doi.org/10.1016/j.supflu.2020.104892,~~**](https://doi.org/10.1016/j.supflu.2020.104892) | [**~~https://doi.org/10.1016/j.supflu.2022.105674]~~**](https://doi.org/10.1016/j.supflu.2022.105674)**~~,~~** |
| **~~optimization and mathematical modeling~~** | [**~~[https://doi.org/10.1080/14786419.2017.1361954~~**](https://doi.org/10.1080/14786419.2017.1361954)**~~,~~** |
| [**~~https://doi.org/10.1016/j.supflu.2017.04.007]~~**](https://doi.org/10.1016/j.supflu.2017.04.007)**~~,~~** | **~~polymer synthesis~~** |

**~~[~~**[**~~https://doi.org/10.1016/j.supflu.2022.105679]~~**](https://doi.org/10.1016/j.supflu.2022.105679)**~~, etc.~~**

***Done. See first four paragraphs of the Introduction chapter***

1. ~~Literature review on the available models could be completed in the introduction section.~~

***The literature review on the available models has been expanded. Check Section 1***

1. ~~As the authors did not conduct any experimental work by themselves, please remove section~~

~~2.4.~~

***Done. The reference to the dataset is moved to the very beginning of the Results section.***

1. ~~Please explain the superiority of the applied model over the similar models in the literature.~~  
   ***Done. See second last paragraph of the Results chapter***
2. ~~Could you report the error between experimental data and model predictions by statistical metrics including AARD%?~~***Done. See table 2***
3. In the material section, please insert the name of material.  
   ***I don’t understand this comment. The name of the biomass and details of experiments were mentioned in the section 2.4, which was removed as suggested in the Comment 10. The detailed of the biomass material has been moved to the first paragraph of section 3***
4. The results and discussion section must be strengthening by comparing the similar works and researches such as **[<https://doi.org/10.1016/j.supflu.2017.04.007>, https://doi.org/10.1080/14786419.2017.1361954].**

***What does it mean ‘discussion section must be strengthening by comparing the similar works and researches’? The suggested articles refer to different models and different datasets.  
The Results section has already an comparison between the obtained results and the articles of Povh et al. and Rahimi et al., who used the same dataset***

1. ~~Explain clearly the limitations of this study?~~***Done. See second last paragraph of the Results chapter***
2. ~~Could you correlate the experimental data to two empirical models for solubility determination of components in supercritical carbon dioxide, proposed in these references~~ [~~[~~](%5b)[**~~https://doi.org/10.1016/j.supflu.2019.01.006,~~**](https://doi.org/10.1016/j.supflu.2019.01.006) [**~~https://doi.org/10.1016/j.jcou.2024.102687~~**](https://doi.org/10.1016/j.jcou.2024.102687)**~~]~~**~~?~~

* ***The suggested empirical correlations have been prepared for pure Imatinib Mesylate and Dapagliflozin Propandiol Monohydrate, which do not appear in this work. Considering that suggested correlations can not be used directly in this work.***
* ***The presented model does not utilize solubility directly.***
* ***As it was discussed in the manuscript, it is assumed that the system did not reach saturation. As a result, the maximum mass of solid dissolved in the solvent or solute concentration in the fluid phase is unknown. If such information is present, the solubility could be used to impose an upper boundary on the state space. As such information is missing, the estimation of solubility might take an arbitrary value which improves the model fitness but not necessarily have physical interpretation.***
* ***Correlating the estimated parameters with solubility models, would increase the number of parameters in the empirical correlations for DiR and ϒ. Taking into account the limited dataset that would lead to overfitting.***
* ***To provide an accurate estimation of the solubility, one should analyze the oil composition and perform a set of experiments focused solely on solubility.***

1. ~~Please provide abbreviations and symbol lists.~~***Done. See second last page of the manuscript***
2. ~~It is recommended removing the last paragraph of conclusion section.~~***Done***
3. Please provide consistency between the abstract and conclusion sections.  
   ***Consistency in what sense?***
4. ~~The number of references could be increased for this type of research work.~~  
   ***Done. As a result of comment 8, the number of references increased***
5. ~~Please set the reference style as per the Journal guidelines.~~

***The citations are superscripted as required***