

## Jury Member Report – Doctor of Philosophy thesis.

**Name of Candidate:** Alexandra Scerbacova

**PhD Program:** Petroleum Engineering

**Title of Thesis:** Investigation of Alkyl Ether Carboxylate Surfactants Performance in Carbonate Reservoirs

**Supervisors:**

Professor Alexey Cheremisin, Skoltech

Associate Professor Ahmed Barifcani, Curtin University

**Co-supervisor:**

Associate Professor Chi Phan, Curtin University

**Name of the Reviewer:** Chengdong Yuan

I confirm the absence of any conflict of interest

(Alternatively, Reviewer can formulate a possible conflict)

**Date:** 19-11-2023

*The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.*

*If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.*

### Reviewer's Report

Reviewers report should contain the following items:

EOR is very important for satisfying the increasing demand of energy. This work is focused on surfactant flooding, which is a promising direction for EOR, especially in harsh and carbonate reservoirs. Therefore, it has significance in practical application. The introduction summarizes all aspects from field development problem faced by carbonate reservoir, why we need to use surfactants, why AECs, the methods for surfactant flooding study, and computational methods for assessing surfactant performance, etc. The work has been done is highly related to the topic, and the thesis is well organized. Both the experimental and computational methods used in this work are very useful and suitable for studying surfactant flooding, which helps to obtain some important findings, for example, the molecular structure – efficiency relationship, showing the scientific significance of this work. In general, this is a high level work, which can be also reflected from the several papers published in Q1 or Q2 journal collected in WOS. Nevertheless, there are some minor points that need to be addressed.

1. It is mentioned this work is for high temperature and high salinity. But 70 C and 10% salinity is not high. Maybe there are some standards in Russia that help to define this? If not, it is better to go for middle-high level.

2. Although the author has done a lot of works, the scientific problems are not clearly indicated as well as the novelties are not summarized well. According to the topic of this work, the author may consider to write in this way:

- ✓ What are the challenges and industrial problems?
- ✓ To solve these industrial problems, what scientific problems should be solved (this is very important for Phd dissertation)
- ✓ Then to solve these problems, what work should be done using what kind of method.
- ✓ The novelties are?

3. Some statements that are not precise should be revised, for example:

- Molecular dynamics simulations and fluid flow evaluation with X-ray saturation monitoring. The authors mentioned as novel approaches. Actually, they are not novel in this topic because they exist and are used already. Only the methods proposed by the author for the first time can be considered as novel or new. The authors can say they are advanced methods.
- “The IFT of C11E11A decreases linearly with increased salt content and achieves the value of less than 1 mN/m only when 10 wt% NaCl is added and the temperature is elevated to 70 °C”. The authors should be careful with “linearly”. Also, IFT really decreases with increasing salt content? There must be a limitation. The author should limit the conditions when saying the general law.
- Another example, “Anions have no substantial impact on the IFT of AECs”. Is this true if the someone only read this sentence?

4. Motivation in the beginning of each chapter looks like conclusion. Motivation should explain why this work should be done.

5. There are some typos that need to be revised carefully, for example, “two ARCs”.

#### **Provisional Recommendation**

*I recommend that the candidate should defend the thesis by means of a formal thesis defense*

*✓ I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate’s thesis according to the recommendations of the present report*

*The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense*

