Oxygen Model User Testing Form (FEniCSx)

1. Test Case ID
FVA-FENICSX-002

2. Model / Feature Being Tested
oxygen_main.py

3. Task Objective
The user is supposed to verify that the Ca.h5, Ca.xdmf, Cc.h5, Cc.xdmf, Ct.h5, Ct.xdmf are given as results after running the code.

4. Preconditions / Setup
Tetrahedron for 3D tetrahedral meshes
• Dirichlet Boundary Conditions
• Installed packages FEniCSx
• HPC (Crescent2)

5. Testing Steps / Procedure
1. Load mesh from b0000/clustered. xdmf
2. Dirichlet boundary conditions
3. Run Python3 oxygen_main.py
5. Postprocess Ca, Cc, Ct output files

6. Expected Output / Behavior
Relative tolerance < 10^{-8}

The following files are given as a result: Ca.h5, Ca.xdmf, Cc.h5, Cc.xdmf, Ct.h5, Ct.xdmf

7. Observed Output / Results
Visual results with good resolution

8. Pass / Fail
Pass

9. Logs / Screenshots / Code Snippets
Paraview screenshots are given as results with slices in the three axis

10. Issue Severity (if applicable)
☒ Low – Affects documentation or minor setup
☐ Medium – Output deviates from expected result, but simulation runs
☐ High – Wrong physics behavior or incorrect solver results
☐ Critical – Solver fails or outputs NaNs/infinite values

11. Observations
The code doesn’t run on MPI; it can only run on serial at Crescent2