

SUPPLEMENTARY INFORMATION

Dissolution Kinetics of Different Inorganic Oilfield Scales in Green Formulations

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Table S1. The percentage error analysis for the dissolution experiment.

| A Slope (ppm/min) | B Slope (mole/l.s) $\frac{A}{(MW * 60 * 30)}$ | C Porosity % | D Diameter (cm) | E Disk cross- sectional area A_c $\frac{\pi}{4}D^2$ | F Initial Surface area(cm ²) $Ac(1 - \emptyset)$ | G (Concentration) Reaction rate (mole/l.s.cm ²) $\frac{B}{F}$ | H wt.(g) Wt _b - Wt _a | I (Weight loss) Reaction rate (mole/l.s.cm ²) $\frac{H}{MW * V(in L) * time(s)}$ | J Error % $\frac{G - I}{G} * 100\%$ |
|--------------------------|--|--------------------|-----------------------|--|--|---|---|--|---|
| 22.9777 | 4.37071E-06 | 3.0968 | 2.5400 | 5.0645 | 4.9077 | 8.90589E-07 | 0.6024 | 7.42515E-07 | 16.6265 |

MW=Molecular Weight

Ac=cross-sectional area, cm²

V=Volume of formulation, L

Wt_b=weight before reaction, g

Wt_a=weight after reaction, g

Table S2. The porosity measurement analysis of different scales studied.

Brine density=1.017678gcm⁻³

| Scale Sample | Diameter (D) | Thickness (T) | Avg. D | Avg. T | Bulk volume (cm ³) | Wt. before (gm) | Wt. after | ΔWt. (g) | PV in cm ³ | Porosity % |
|--------------------------------|--------------|---------------|--------|--------|--------------------------------|-----------------|-------------|------------|-----------------------|------------|
| SrSO ₄ | 25.4 | 14.5 | 25.327 | 14.50 | 7.301 | 25.1363 | 25.366 4 | 0.230 1 | 0.2261 | 3.10 |
| | 25.3 | 14.52 | | | | | | | | |
| | 25.28 | 14.48 | | | | | | | | |
| Fe ₇ S ₈ | 25.2 | 9.44 | 25.260 | 9.54 | 4.778 | 20.1336 | 20.153 1 | 0.019 5 | 0.0192 | 0.40 |
| | 25.3 | 9.7 | | | | | | | | |
| | 25.28 | 9.48 | | | | | | | | |
| PbS | 25.28 | 11.56 | 25.293 | 11.6 | 5.826 | 16.2161 | 16.255 5 | 0.039 4 | 0.0387 | 0.66 |
| | 25.3 | 11.54 | | | | | | | | |
| | 25.3 | 11.7 | | | | | | | | |
| CaCO ₃ | 38.2 | 12.26 | 38.133 | 12.42 | 14.178 | 24.7653 | 28.692 | 3.926 7 | 3.8585 | 27.22 |
| | 38.2 | 12.4 | | | | | | | | |
| | 38 | 12.6 | | | | | | | | |
| BaSO ₄ | 23.8 | 14.8 | 24.100 | 14.60 | 6.657 | 27.0067 | 27.149 9 | 0.143 2 | 0.1407 | 2.11 |
| | 24 | 14.4 | | | | | | | | |

| | | | | | | | | | | | |
|--|------|------|--|--|--|--|--|--|--|--|--|
| | 24.5 | 14.6 | | | | | | | | | |
|--|------|------|--|--|--|--|--|--|--|--|--|

$$Bulk\ volume = 0.001 \times \frac{\pi}{4} \times Avg.\ D^2 \times Avg.\ T$$

$$PV = \frac{\Delta Wt.}{Brine\ density}$$

$$\% Porosity = \frac{PV}{Bulk\ volume} \times 100\ \%$$