**Synthetic Brine Questions Phase II**

**Table 1. Salton Sea Brine Composition**

|  |  |  |  |
| --- | --- | --- | --- |
| **Composition** | **Response** | **Composition** | **Response** |
| **Wt% of Solubles** | *29.6%* | **Redox Potential** | *See question 5 below* |
| **Particle Size** | *Synthetic brines will be particulate free* | **Viscosity** | *0.019 poise (estimate)* |
| **Wt% of insoluble** | *Synthetic brines will be particulate free* | **TDS** | *296,000 ppm* |
| **Brine Particle (suspensions) concentration** | *Synthetic brines will be particulate free* | **Salinity** | Chlorinity 7.1 molal |
| **Water Content** | *100 – Wt% solubles* | **Silica, Iron, and Calcium Concentrations** | *Target (ppm) Silica – 0 Iron – 1,670 Calcium – 35,600* |
| **pH** | *~ 2.3* | **What are the concentrations of all dissolved species (ions and organic matter)** | *Target (ppm) Boron – 430 Calcium – 35,600 Chloride – 177,000 Iron – 1,670 Potassium – 17,900 Lithium – 231 Manganese – 2,090 Sodium­ – 59,400* |
| **What is the oxidation state of the components of the brine (e.g. Fe2+ or Fe3+ if present)** | *FeCl2 MnCl2* |  |  |

1. **Does the brine contain organics or other volatiles?**

Analysis on field samples of Salton Sea geothermal brine will be done to verify the inorganic and organic acid anion concentrations. The proposed synthetic brine composition (Table 2) does not include organics or other volatiles. However, the composition of the synthetic brine may be modified slightly based on the results of chemical characterization of natural brine samples.

1. **Can we have a brine parameter ranges we can check with? No need to be exact the same but just give us a reference about temperature, which ions are in it and turbidity? Or will it be a blind test?**

|  |  |  |  |
| --- | --- | --- | --- |
| Table 2. Calculated concentrations of Synthetic Lithium Prize Brine (SLPB) Compared to measured concentrations of Simbol Feed Brine (SFB). | | | |
| Constituent | SLPB | SFB | Difference |
|  | mg/kg | mg/kg | % |
| Boron | 430 | 432 | -0.5% |
| Calcium | 35,600 | 37,600 | -5.3% |
| Chloride | 177,000 | 165,000 | 7.3% |
| Iron | 1,670 | 1,680 | -0.6% |
| Potassium | 17,900 | 18,900 | -5.3% |
| Lithium | 231 | 232 | -0.4% |
| Manganese | 2,090 | 2,100 | -0.5% |
| Sodium | 59,400 | 62,700 | -5.3% |
| TDS | 296,000 | 290,000 | 2.1% |

The target brine composition is provided in Table 2. As the intent is to have a single-phase brine there should not be turbidity. Although, the shipping/preparation temperature of the synthetic brine will be room temperature (~20 °C), the reinjection temperature of the Simbol Feed Brine (see Table 3) upon which the synthetic brine is based has a temperature of ~110 °C.

1. **Will this brine separate into two phases below boiling? Will it be modified to stay in solution? Will the brines be sub-boiling?**

The synthetic brine will be a single phase sub-boiling synthetic brine.

1. **Is there a standard brine temperature that we all should assume in our work?**

To facilitate shipping and handling the developed synthetic brine will be shelf stable (e.g., precipitate free) at room temperature (~20 °C). See response to question 2 regarding possible operating temperatures.

1. **Are these brine air/oxygen sensitive?**

The synthetic brine will include both Fe2+ and Mn2+; although no attempt will be made to control redox conditions, the brine will be delivered in a closed container. Given the low target pH of the synthetic brine neither Fe- nor Mn-hydrous oxides are expected to precipitate if the brine inadvertently become oxidized.

1. **What constituents are missing from the synthetic brine that are present in real Salton Sea brine?**

The synthetic brine only includes constituents that are present in the Simbol Feed Brine (see Table 2) at concentration greater than 0.04 molal. Exclude constituents include aluminum, ammonia, antimony, arsenic, barium, copper, fluoride, lead magnesium, ammonia, silica, silver, sulfate, and strontium. Also see response to question 1 above.

1. **What real brine sample (e.g., after crystallization reaction clarifier CRC process or after acidification) does the synthetic brine represents?**

The synthetic brine will be representing the “Simbol Feed Brine” (see Table 3) that is essentially the injection brine from the crystallizer/clarifier process.

1. **What safety features needed to be followed while performing experiments with brine and the disposal provisions?**

Safety procedures will be forthcoming for use in Phase 3.

Table 3. Simbol Feed Brine Composition

