

*[Geophysical Research Letters]*

Supporting Information for

**Rheological properties of composite smectite–quartz suspensions**

Kameda J.1 and Morisaki, T.1

1Earth and Planetary System Science, Graduate School of Science, Hokkaido University,

N10W8, Kita-ku, Sapporo, 060-0810, Japan

**Contents of this file**

Figure S1, Figure S2, Tables S1

**Introduction**

Figure S1 provides XRD patterns for specimens of smectite (Kunipia-F) and quartz. Figure S2 shows the comparison between the flow curves obtained using the normal procedure and that with preshearing. Table S1 provides detailed information concerning the tested suspensions and the determined rheological parameters.



Figure S1. XRD patterns for specimens of smectite (Kunipia-F) and quartz. Impurities were not detected.



Figure S2. (a) Flow curves (strain rate vs. shear stress) for the 50 w/v% suspension containing 25 wt% smectite in the solid component. The red and blue symbols indicate data obtained using the normal procedure (also shown in Fig. 2) and that with preshearing, respectively. The yield stress and dynamic viscosity were determined by fitting the data using the Bingham fluid model (solid lines). (b) An enlarged portion of (a) for strain rate between 0 and 100 sec–1.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample | Smectite (wt%) | Quartz (wt%) | w/v (%) | Temperature (℃) | NaCl concentration (M) | pH | Yield stress (Pa) | Viscosity (Pa.s) | Strain rate range for fitting (s-1) | R2 |
| K100-10wv | 100 | 0 | 10 | 7 | 0.6 | - | 0.09 | 0.0062 | 01-654 | 0.995 |
| K100-15wv | 100 | 0 | 15 | 7 | 0.6 | - | 4.16 | 0.0194 | 81-654 | 0.998 |
| K100-20wv | 100 | 0 | 20 | 7 | 0.6 | - | 15.16 | 0.0275 | 123-654 | 0.998 |
| K100-25wv | 100 | 0 | 25 | 7 | 0.6 | - | 21.69 | 0.0369 | 186-654 | 0.999 |
| K100-30wv | 100 | 0 | 30 | 7 | 0.6 | - | 30.35 | 0.0499 | 185-981 | 0.997 |
| K100-30.5wv | 100 | 0 | 30.5 | 7 | 0.6 | - | 41.73 | 0.0617 | 185-965 | 0.999 |
| K100-31.1wv | 100 | 0 | 31.1 | 7 | 0.6 | - | 71.68 | 0.1031 | 179-981 | 0.997 |
| K80-26.7wv | 80 | 20 | 26.7 | 7 | 0.6 | - | 11.67 | 0.0207 | 122-981 | 0.995 |
| K80-30wv | 80 | 20 | 30 | 7 | 0.6 | - | 17.90 | 0.0300 | 185-981 | 0.994 |
| K80-34.3wv | 80 | 20 | 34.3 | 7 | 0.6 | - | 31.49 | 0.0532 | 185-981 | 0.994 |
| K60-26.7wv | 60 | 40 | 26.7 | 7 | 0.6 | - | 3.51 | 0.0177 | 80-647 | 0.998 |
| K60-30wv | 60 | 40 | 30 | 7 | 0.6 | - | 10.16 | 0.0197 | 92-981 | 0.995 |
| K60-34.3wv | 60 | 40 | 34.3 | 7 | 0.6 | - | 15.10 | 0.0300 | 122-647 | 0.997 |
| K60-37wv | 60 | 40 | 37 | 7 | 0.6 | - | 27.44 | 0.0499 | 115-981 | 0.999 |
| K40-34.3wv | 40 | 60 | 34.3 | 7 | 0.6 | - | 4.28 | 0.0137 | 80-647 | 0.999 |
| K40-40wv | 40 | 60 | 40 | 7 | 0.6 | - | 7.07 | 0.0272 | 80-647 | 0.998 |
| K40-48wv | 40 | 60 | 48 | 7 | 0.6 | - | 20.34 | 0.0486 | 122-647 | 0.998 |
| K40-50wv | 40 | 60 | 50 | 7 | 0.6 | - | 41.48 | 0.1240 | 122-647 | 0.998 |
| K25-40wv | 25 | 75 | 40 | 7 | 0.6 | - | 1.09 | 0.0120 | 185-981 | 0.993 |
| K25-50wv | 25 | 75 | 50 | 7 | 0.6 | 8.91 | 16.76 | 0.0355 | 76-656 | 0.998 |
| K25-60wv | 25 | 75 | 57.1 | 7 | 0.6 | - | 31.35 | 0.0586 | 76-656 | 0.998 |
| K25-61.5wv | 25 | 75 | 61.5 | 7 | 0.6 | - | 42.64 | 0.0916 | 123-647 | 0.999 |
| K10-50wv | 10 | 90 | 50 | 7 | 0.6 | - | 0.23 | 0.0098 | 34-980 | 0.984 |
| K10-66.7wv | 10 | 90 | 66.7 | 7 | 0.6 | - | 2.26 | 0.0234 | 15-981 | 0.999 |
| K10-80wv | 10 | 90 | 80 | 7 | 0.6 | - | 25.90 | 0.1096 | 82-981 | 0.999 |
| T-2 | 40 | 60 | 40 | 2 | 0.6 | - | 7.72 | 0.0315 | 53-647 | 0.997 |
| T-15 | 40 | 60 | 40 | 15 | 0.6 | - | 6.51 | 0.0244 | 122-647 | 0.998 |
| T-25 | 40 | 60 | 40 | 25 | 0.6 | - | 8.03 | 0.0255 | 122-981 | 0.987 |
| T-30 | 40 | 60 | 40 | 30 | 0.6 | - | 8.54 | 0.0281 | 185-647 | 0.996 |
| M-0.2 | 10 | 90 | 50 | 7 | 0.2 | - | 77.93 | 1.3562 | 49-981 | 0.999 |
| M-0.3 | 10 | 90 | 50 | 7 | 0.3 | - | 43.27 | 0.1196 | 116-656 | 0.999 |
| M-0.4 | 10 | 90 | 50 | 7 | 0.4 | - | 8.20 | 0.0152 | 23-981 | 0.999 |
| M-0.5 | 10 | 90 | 50 | 7 | 0.5 | - | 0.23 | 0.0136 | 07-80 | 0.985 |
| pH-1 | 25 | 75 | 50 | 7 | 0.6 | 1.14 | 8.42 | 0.0240 | 80-981 | 0.999 |
| pH-3 | 25 | 75 | 50 | 7 | 0.6 | 3.03 | 8.51 | 0.0254 | 80-981 | 0.998 |
| pH-5 | 25 | 75 | 50 | 7 | 0.6 | 5.76 | 10.51 | 0.0245 | 53-647 | 0.999 |
| pH-7 | 25 | 75 | 50 | 7 | 0.6 | 7.14 | 11.50 | 0.0246 | 53-647 | 0.999 |

Table S1. Details of the tested suspensions and the determined rheological parameters.