

2141341

HW 1

1. The WLF equation may be written using any convenient reference temperature. The form of the equation remains the same but the values of the constants C_1 and C_2 change. Using the universal values for C_1 and C_2 at T_g , calculate C_1 and C_2 for a reference temperature of $T_g + 50$ °C.
2. Using the data below, construct a plot of $\log a_T$ vs. $T - T_g$ and use it to construct a MASTER CURVE for this material. Assume the T_g of the material is 150.8 °C

| T (°C) | log t | log E(t) | T (°C) | log t | log E(t) |
|--------|-------|----------|--------|-------|----------|
| 130 | 2 | 10.25 | 141 | 2 | 10.19 |
| | 2.25 | 10.25 | | 2.25 | 10.19 |
| | 2.5 | 10.25 | | 2.5 | 10.16 |
| | 2.75 | 10.25 | | 2.75 | 10.13 |
| | 3 | 10.22 | | 3 | 10.09 |
| | 3.25 | 10.19 | | 3.25 | 10.03 |
| | 3.5 | 10.16 | | 3.5 | 9.94 |
| | 3.75 | 10.13 | | 3.75 | 9.82 |
| | 4 | 10.06 | | 4 | 9.66 |
| | 4.25 | 10.03 | 4.25 | 9.5 | |

| T (°C) | log t | log E(t) | T (°C) | log t | log E(t) |
|--------|-------|----------|--------|-------|----------|
| 142 | 2 | 10.13 | 144.6 | 2.75 | 9.03 |
| | 2.25 | 10.09 | | 3 | 8.72 |
| | 2.5 | 10.03 | | 3.25 | 8.5 |
| | 2.75 | 9.97 | | 3.5 | 8.25 |
| | 3 | 9.88 | | 3.75 | 8.09 |
| | 3.25 | 9.67 | | 4 | 7.94 |
| | 3.5 | 9.63 | | | |
| | 3.75 | 9.47 | | | |
| | 4 | 9.22 | | | |

| T (°C) | log t | log E(t) | T (°C) | log t | log E(t) |
|--------|-------|----------|--------|-------|----------|
| 144.9 | 2.25 | 9.66 | 146 | 2.5 | 8.72 |
| | 2.5 | 9.5 | | 2.75 | 8.47 |
| | 2.75 | 9.28 | | 3 | 8.25 |
| | 3 | 9.03 | | 3.25 | 8.06 |
| | 3.25 | 8.88 | | 3.5 | 7.94 |
| | 3.5 | 8.66 | | 3.75 | 7.82 |
| | | | 4 | 7.67 | |

| T (°C) | log t | log E(t) | T (°C) | log t | log E(t) |
|--------|-------|----------|--------|-------|----------|
| 150.8 | 2 | 7.97 | 156 | 2 | 7.59 |
| | 2.25 | 7.85 | | 2.25 | 7.55 |

| | | | |
|------|------|------|------|
| 2.5 | 7.78 | 2.5 | 7.5 |
| 2.75 | 7.72 | 2.75 | 7.41 |
| 3 | 7.69 | 3 | 7.34 |
| 3.25 | 7.64 | 3.25 | 7.25 |
| 3.5 | 7.59 | 3.5 | 7.19 |
| 3.75 | 7.55 | 3.75 | 7.06 |
| 4 | 7.5 | 4 | 6.94 |
| 4.25 | 7.44 | 4.25 | 6.78 |
| 4.5 | 7.34 | 4.5 | 6.59 |
| 4.75 | 7.25 | 4.75 | 6.38 |
| | | 5 | 6.13 |

| T (°C) | log t | log E(t) | T (°C) | log t | log E(t) |
|--------|-------|----------|--------|-------|----------|
| 159 | 2.25 | 7.34 | 161.5 | 2.25 | 7.06 |
| | 2.5 | 7.25 | | 2.5 | 6.97 |
| | 2.75 | 7.16 | | 2.75 | 6.85 |
| | 3 | 7.03 | | 3 | 6.64 |
| | 3.25 | 6.94 | | 3.25 | 6.5 |
| | 3.5 | 6.78 | | 3.5 | 6.31 |
| | 3.75 | 6.63 | | 3.75 | 6.06 |
| | 4 | 6.41 | | 4 | 5.78 |
| | 4.25 | 6.13 | | 4.25 | 5.47 |
| | 4.5 | 5.85 | | | |
| 4.75 | 5.53 | | | | |

| T (°C) | log t | log E(t) | T (°C) | log t | log E(t) |
|--------|-------|----------|--------|-------|----------|
| 167 | 2.25 | 6.72 | 171 | 2.25 | 6 |
| | 2.5 | 6.5 | | 2.5 | 5.72 |
| | 2.75 | 6.25 | | 2.75 | 5.41 |
| | 3 | 5.97 | | 3 | 5.03 |
| | 3.25 | 5.63 | | 3.25 | 4.63 |
| 3.5 | 5.22 | | | | |