2.3.3. Total breakup

Total breakup time is defined as the time when the drop (if a coherent drop persists) and all its fragments no longer undergo further breakup. Correlations for total breakup time are given by

$$T = 6\,(\mathrm{We} - 12)^{-0.25}, \qquad 12 \leqslant \mathrm{We} \leqslant 18, \qquad [8]$$

$$T = 2.45\,(\mathrm{We} - 12)^{0.25}, \qquad 18 \leqslant \mathrm{We} \leqslant 45, \qquad [9]$$

$$T = 14.1\,(\mathrm{We} - 12)^{0.25}, \qquad 45 \leqslant \mathrm{We} \leqslant 351, \qquad [10]$$

$$T = 0.766\,(\mathrm{We} - 12)^{0.25}, \qquad 351 \leqslant \mathrm{We} \leqslant 2670, \qquad [11]$$

and

$$T = 5.5, \quad \mathrm{We} \geqslant 2670, \qquad [12]$$

and compared with experimental data in figure 5.

The total breakup times, which are given by the above correlations, are for low-viscosity drops ($\mathrm{On} < 0.1$). Based on limited data, Gel'fand *et al.* (1975) proposed a correlation for total breakup time when viscosity is not negligible:

$$T = 4.5(1 + 1.2\ \mathrm{On}^{1.64}), \qquad \mathrm{We} < 228. \qquad [13]$$

In the inviscid limit, the Gel'fand *et al.* expression is an oversimplification, and clearly [8]–[12] provide a more accurate representation of the existing data.