

Electronic Supplementary Material

A refined phase diagram of tert-butanol – water system and implications on lyophilization process optimization of pharmaceuticals

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Data points for phase diagram:

The determination of zero heating rate relevant calculations are mentioned in *table S1*.

Table S1: Determination of zero heating rate

| Data from experiments on unannealed solutions | | | | | | |
|--|---------------------|---|--|--|--------------------------|--|
| TBA, % w/w | Water, % w/w | Eutectic melting temp from unannealed systems - 2C/min | Eutectic melting temp from unannealed systems - extrapolated to 0°C/min | Equation from the unannealed data extrapolated to a zero-heating rate | Correction factor | Calculated eutectic melt for annealed solutions |
| 2.5 | 97.5 | -7.81 ± 0.06 | -8.56 ± 0.04 | y = 0.3742x - 8.5583 | -0.75 | -8.20 |
| 5 | 95 | -7.61 ± 0.12 | -8.36 ± 0.00 | y = 0.3789x - 8.3552 | -0.75 | -7.9 |
| 10 | 90 | -6.92±0.06 | -8.20±0.03 | y = 0.6724x - 8.2001 | -1.28 | -7.40 |
| 15 | 85 | -6.40±0.25 | -8.19±0.09 | y = 0.9029x - 8.1921 | -1.79 | -7.81 |
| 20 | 80 | -5.93±0.19 | -8.17±0.01 | y = 1.1537x - 8.1713 | -2.24 | -8.17 |
| 25 | 75 | -5.89±0.07 | -8.17±0.09 | y = 1.1669x - 8.1712 | -2.28 | -8.17 |