Solution to the molality–molarity challenge

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Solution

If the molality equals the molarity, we can write:

$$M = 1000M / (1000d - \text{gfw} \times M)$$

And then:

$$1000d - \text{gfw} \times M = 1000$$

It can be seen that when d is less than unity it is impossible for molality to equal molarity. For instance, if d is 0.9023 g/mL, we can see that for all values of M and gfw the left side of the above equation is smaller than 1000. However, if we add an inert electrolyte to the solution, so the density is larger than 1, this limitation is overcome and molarity can be made equal to molality.

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This article is the solution to the Analytical Challenge to be found at <http://dx.doi.org/10.1007/s00216-011-5153-6>

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