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Spin-Offs from homogeneous nucleation in polymer solutions

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Abstract
The data and theory have been done for the problem of homogeneous nucleation in polymer solutions. The governing equation for this process is $T - To = 3\ k\ To^2\ w_2\ MWo/\sigma_o\ a_o\ MW_2$ and three uses have been found. In this article, the author will explain the uses and outline the reasoning behind them. First, the above equation presents itself as a new way to measure molecular weight polymer, which will be developed. Second, this equation has implications for interstellar space travel, in that it outlines how a matter-antimatter reactor can be used for propulsion along with magnetic bottles that hold electrons and antielectrons after they have been captured. Third, by assuming that the starting equation derived from classical nucleation theory applies for gaseous solution→liquid, then it only takes algebra to come up with a formula for onset of rain in clouds. This governing equation is supposed to apply in more ways, and is different than boiling point elevation that requires a special thermometer to measure millidegrees.

Keywords: Homogeneous Nucleation, Polymer Solutions, Spin-Offs, Rainfall, Space Travel, Polymer Molecular Weight

Introduction
A new theory can have multiple applications. The author did the math for the governing equation and saw three possible uses. In the next three sections, the spin-offs for Jennings' Polymer Research Journal [1] equation will be developed.

Determination of molecular weight polymer
Now, boiling point elevation is used to measure polymer molecular weight Blackmore [2] but that effect is one of millidegrees Centigrade difference whereas for limit of superheat Jennings and Middleman [3] there was a difference of 10-15 degrees Centigrade rise for 2000 and 4000 MW polystyrene in cyclohexane.

I propose limit of superheat as a possible way to measure polymer MW. What would be employed is the rising drop method of Jennings and Middleman, where $\Delta T = T - To$ is inversely proportional to MW_2, polymer molecular weight. However, in superheat this method is less able to distinguish MW of high polymer.

Interstellar space travel
The author had an idea that electrons and antielectrons can be harvested by proper magnetic filters. In outer space, it could be that free electrons and free antielectrons are separated by Liedenfrost layers.

These two rotate in the opposite direction in a magnetic field and it has been shown that antimatter can be stored (see Ref. (12) in phase change and space travel [4]. With ingenious engineering, the matter and antimatter would go from magnetic bottles to propel the spacecraft. This is discussed in [4].

Selection of clouds to seed for rain
The governing equation above is assumed to apply in reverse, that is, instead of a polymer solution we posit a "solution" of atmospheric constituents plus water vapor in a cloud. In contrast to a polymer solution superheating to give way to solvent bubbles, in a raincloud, the gaseous solution supercools to critical-sized rain droplets.

The resulting equation for this process is derived as Equation (9) in IAJER [5] and is presented here.

$$T - To = (3\ k\ To^2 /\sigma_o\ a_o)\ (P^*H_2O/Pair)\ RH \qquad (9)$$

Presumably this IAJER formula would enable people to identify candidate clouds for seeding in the mountains with AgI, NaCl or dry ice. The airplane has instruments to measure T, Pair and RH. P^*H_2O, σ_o, and a_o can be calculated. It takes a computer to get To, the dewpoint, where the cloud starts to form rain. Given that T is dropping down to To, cloud-seeding can be done.

Conclusion

This very brief mini-review is intended to produce further study and interest in nucleation. It is important to determine molecular weight polymer. Man is looking to the stars, so conceivably the governing equation provides inspiration on how to fuel space travel. Since there is a problem with drought in various areas of the world, something has to be done to stimulate rain in mountains.

Table 1: Nomenclature

1	a_o	surface area of solvent molecule
2	k	Boltzmann constant
3	MWo	molecular weight solvent
4	MW_2	molecular weight polymer
5	Pair	air pressure at T
6	P^*H_2O	vapor pressure of water at T
7	RH	relative humidity inside cloud
8	T	temperature inside cloud or T solution
9	To	temperature of limit of superheat of solvent or dew point
10	w_2	weight fraction polymer
11	σ_o	surface tension of solvent

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