Aerosol Condensation and Clouds

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Chemical Engineering is a subject dominated by the study of heat and mass transfer, mostly with fluids. The earth's climate and weather is controlled by heat transfer and the mass transfer of water either as liquid, solid or vapour. The heat transfer between these phases by latent heat provides most of the heat transfer in warmer parts of the atmosphere which occurs by condensation into clouds. The atmosphere is an outside laboratory which shows many complex processes involving condensation and behaviour of aerosol in clouds, some of which are still not well understood. The uncertainty arising from this provides the major uncertainty in predictions of the earth's warming by the Greenhouse Effect.

In this seminar we describe the varieties of water vapour condensation which occur in the atmosphere and the associated heat transfers which take place. The ways in which clouds respond to radiative heat transfer and the complex mass transfers that occur within clouds are also covered. These transfers lead to the formation of large raindrops which fall out, and there are many unanswered questions in this area. More detailed observations and knowledge are still needed as to the effect of hygroscopic aerosols, charging and electrostatics, and transfers taking place in highly turbulent flows.

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