also assists subsequent breakdown so that a following crop may be sown with increased safety. Persistence may be varied according to the formulation of the chemical used. Dr. van der Zweep brought his contribution to an end by appealing for information on the half-life of herbicides, a half-life determined in the first instance in standardized laboratory tests. Such a system could be extended to field studies where the variation would be apparent and could be measured.

The full proceedings of the meeting together with reports of the discussion which followed each paper will be published by Blackwell Scientific Publications, Ltd., later this year.

COLLOID AND POLYMER SCIENCE

CONTINUING earlier seminars[1] in the Department of Chemistry of University College, London, nine lectures were given during February 25–March 18. Drs. C. H. Bamford and J. A. Kitchener summarized work (some of which has been published[2,3]) on calculation of free-radical reactivity and stability of colloidal model suspensions. Prof. J. A. V. Butler discussed some flow properties of dilute solutions of deoxyribonucleic acid in 0·2 *N* sodium chloride, the rate of shear being varied in the range 0·5–30,000 sec.$^{-1}$. At the high rate of shear no permanent change of the solute occurred, but some disentangling of networks. Using the theories of Kuhn and Kuhn[4] and Cerf[5], for the results obtained at low rate of shear, it appears that the deoxyribonucleic acid molecule is somewhat flexible. Dr. P. W. Allen described the grafting of methylmethacrylate polymers on natural rubber latex using hydrogen peroxide, together with a polyethylene amine, as initiators. Under these conditions the graft co-polymer is mainly formed on the surface of the latex. If oil-soluble initiators are used, polymerization of methylmethacrylate occurs inside the latex. Dr. C. Robinson reviewed recent work[6] on liquid crystals of synthetic polypeptide and described a new effect: if a concentrated solution of poly-γ-ethyl-L-glutamate is illuminated with white light, brilliant iridescent colours are reflected. This is explained as an optical analogue of an X-ray powder diagram. There are indications that deoxyribonucleic acid solutions can also form liquid-crystals.

Prof. A. Katchalsky discussed the application of the thermodynamics of irreversible processes[7] to the study of colloid–chemical phenomena. The treatment of entropy production as the sum of the products of generalized forces and conjugated flows was outlined. Sufficiently slow flows are linearly dependent on all the forces operative in the system, through a set of phenomenological equations, the coefficients of which obey Onsager's law[8] and constitute a symmetrical matrix. The phenomenological equations provide a convenient formal framework for the description of electrokinetic phenomena[9], and permit the establishment of the classical Saxen relations on a thermodynamic basis. A similar treatment[10] of polyelectrolyte solutions leads to new correlations between transport phenomena, such as diffusion, sedimentation and conductance. The thermodynamic approach is useful in the analysis of membrane permeability[11–13]; contradictions inherent in the conventional equations do not occur and a consistent set of equations is obtained, suitable for the description of the transport of electrolytes and non-electrolytes through membranes[14]. The coefficients of these equations were transcribed in terms of frictional forces and distribution coefficients, which characterize the interaction of the permeant solutes with the membrane. In the last lecture, Prof. Katchalsky discussed some fundamentals of mechanochemistry[15].

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[9] Mazur, P., and Overbeek, I. F., *Rec. Trav. Chim. Pays-Bas*, **70**, 83 (1951).
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EFFECTIVENESS IN INDUSTRY

THE presidential address of Mr. W. E. Bargett to the Institution of Metallurgists, though specifically directed to that profession, had much of direct interest for other technologies. In discussing the training of both graduates and juniors he pointed out the necessity of realizing that the former, though 'educated', have still to receive a 'training' even if during this period they can give little immediate return for their salaries. Equally, "the inefficient utilization of junior people's time is out of keeping with the demands of industry for greater numbers of well-qualified technologists and must be eliminated through sheer economic necessity". It is a general experience that a bright junior is quickly frustrated when called upon to do repetitive work which provides little experience and makes no particular intellectual demand. The interesting suggestion was made that a solution of this problem might be found by employing older people who may have had no special training, but who have sufficient intelligence to learn all that is required to carry out specific operations, appreciating not only what to do but also why it is done in a certain way. Experience has shown that there is no difficulty in filling