X-ray diffraction technology on transfer RNA might not spurn to use their model building programmes on such a problem. It looks sufficiently constrained to offer reasonable expectations.

MATERIALS

No Substitute for Wood

from a Correspondent

SOME old and new cellular materials were the topic for discussion when the Materials Science Club met at Great Malvern on November 11 and 12. Dr H. A. Lancely (Shell Research), describing the production and properties of polystyrene foam, paid particular attention to factors which control the final product density. Polymerization conditions, particularly with respect to molecular weight and bead size and also rate of pre-expansion, all contribute to give a final rigid cellular structure with a density of 14–16 kg/m³. The mechanical and thermal properties of this material are dependent on the cell structure, and there are interesting correlations between this and the bulk density.

Polyurethanes derive from the reaction between isocyanate and a hydroxy compound and can give both flexible and rigid foams of 97 per cent non-solid content. Dr J. F. Wood (ICI Dyestuffs) explained that flexible foam is made from tolylenediisocyanate and polyether, whereas rigid foam is made from crude diphenylmethane diisocyanate and polygols. The "holes" are introduced either chemically, by the generation of carbon dioxide by subsidiary reaction, or physically by the expansion of a low boiling point liquid such as trichlorofluoromethane. Rigid foam, when compounded with a suitable fire retardant, is self-extinguishing, but it does not necessarily form a substantial barrier to fire. Foams made by an isocyanate reaction are being produced commercially, and by the formation of a strong char they offer a useful barrier to the spread of fire.

As a naturally occurring cellular material, based on cellulose, wood is still highly competitive in certain structures, and to many people it is more aesthetically pleasing. Dr J. M. Dinwoodie (Forest Products Research Laboratory) discussed the reason for the axisotropic behaviour of this material, based on variation in the unit cell structure. The strength is also related to the fibre length, and the failure mechanism could be characterized using the scanning electron microscope. As a competitor to a natural material, leather, the cellular substitutes poromerics are gradually gaining prominence in the shoe trade. Mr R. E. Wittaker (Shoe and Allied Trade Association) explained the need for a material with the cellular structure of leather but which could be shaped using the more recently evolved techniques of the plastics industry, such as vacuum forming, if the industry were to retain its competitive position.

Tracing the development of the poromerics, he described the current move away from reproducing exactly the structure of leather, as in the earlier materials. The problems of crack propagation and surface delamination were related to the moisture properties of the structure.

Although rather a late comer to the field, polyolefin foam is finding an increasing usage. Dr J. G. Webster (Expanded Rubber and Plastics) compared the various routes to polyethylene foam and showed how its specific properties were being used in such diverse fields as civil engineering and ladies' underwear. Rigid polyurethane foam is used in the 'struction of roads, to prevent frost damage, and is sufficiently load bearing to be incorporated into the substructure. But it is principally as a thermal insulation that the material is used most, particularly in refrigerator linings and also as a cavity filler in buildings. Rigid metal foams are quite a new invention. Mr W. A. Gurney (Dunlop Research Centre) exhibited numerous examples using a remarkable range of metals. Possible applications are in the aircraft industry to reduce engine noise and as a very high temperature insulation material. Honeycomb materials, as structural sandwiches, are also widely used in the aircraft industry and the properties of this range of material were discussed by Mr D. Findlater (CIBA (ARL Ltd)).

When considering the problem of thermal insulation at high temperatures (about 2,000° C) the choice of available material is limited. Dr C. R. Thomas (Atomic Weapons Research Establishment) described syntactic carbons—a novel form of low density carbon—of non-interconnecting cell structure which is load bearing. By bonding small hollow microspheres of phenol formaldehyde polymer with a miniscus of resin and then carbonizing in an inert atmosphere the controlled structure is formed. By simple variations of this procedure densities in 0·15–0·8 g/cm³ can be produced. The stress–strain characteristics in compressions show that the material behaves as a typical brittle material. It has a high modulus in the initial stages, but the elastic region extends only to about 2 per cent compression. The principal application is as a strong thermal insulation for high temperature furnaces and for certain space applications where low density is a desirable property.

CARBONIFEROUS

Did Ice split Gondwanaland?

from our Geomagnetism Correspondent

ICE can claim an honourable place in the history of the continental drift controversy, for the geometry of the southern hemisphere Carboniferous ice sheet was part of the evidence for drift originally adduced by Wegener. The discovery that parts of what are now Africa, South America, India, Antarctica and Australia were simultaneously glaciated by a single ice sheet during the Carboniferous, and that the quantity of ice available was insufficient to cover these and intervening areas with the continents in their present positions, led inevitably to the idea that the continents in question once formed one single supercontinent, Gondwanaland.

In this case, ice was used simply as circumstantial evidence for the drift hypothesis. But could the Carboniferous ice sheet have played a more direct part in drift? Gough (*J. Geophys. Res.*, **75**, 4475; 1970) speculates that the ice sheet may well have been sufficient to bring about the break-up of the continents in the first place. It is now many decades since Wegener documented the evidence for continental drift, and it is perhaps surprising that this idea has not been thought of before. But although drift is now accepted almost as fact rather than hypothesis, little attention