that chemistry departments are scraping the barrel to fill available places. Nevertheless, in all the four years which came under the scrutiny of the committee, university chemistry places were left unfilled. This state of affairs, the committee suggests, "is a matter of concern for the country in general and for the chemical profession in particular".

But the number of chemistry graduates likely to be produced by the universities during the next few years will not fall much short of Britain's requirements for specialist chemists. Chemistry graduates have consistently formed the largest proportion of unemployed scientists six months after they have graduated, and this factor has led to suggestions that output from university chemistry departments is already too great to be absorbed by industry. But the committee takes a different view. It suggests that one of the chief troubles is that too few chemistry graduates are accepted for jobs in management, administration, government and politics, and it points out that the situation in Britain is very different from that in the United States, where only half the chemistry graduates take up jobs specifically requiring chemical knowledge.

It is therefore surprising to find that the report pours cold water on the idea that chemistry courses should be despecialized—the committee has some sharp words to say about the suggestion canvassed in, for example, the Swann report, that graduates would be more useful to industry if they had studied a wider range of subjects to a less advanced level than is now customary in special degrees. "We do not accept that any possible gains would outweigh the loss of professional competence in the subject of specialization," the committee maintains, and moreover "we encountered no clear opinion in the chemistry industry as a whole that the present degree courses in chemistry are too specialized."

What, then, is to be done? The committee suggests that, for one thing, chemistry courses tend to involve "too much learning of facts", and it suggests that chemistry teachers should consider ways to get round this. There is also a suggestion that chemistry students should be given the option of studying courses such as economics, sociology and computer programming. But such courses should be available only as subsidiaries and should not dilute the specialist nature of the major chemistry course.

The committee is satisfied with the proportion of undergraduates in chemistry departments who intend to take up careers in industry, and it also suggests that employers are satisfied with the graduates they get. But the proportion of graduates entering teaching is another matter. The committee believes that it is "unfortunate" that the teachers must now have teacher training qualifications before they can take up school teaching, because this restriction is likely to deter the more able graduates away from the schools. A means of offsetting this deterrent should be found, the committee urges, and as a minimum, grants for the compulsory training year should be equivalent to those for PhD students.

As far as PhD courses in chemistry are concerned, the committee is generally satisfied: "We believe that existing PhD courses provide a good preparation for chemists who will take up research careers, including those who will move to non-research posts after a few years in industry". Nevertheless, the committee recommends that some variants of the normal PhD course should be introduced. One suggestion which is canvassed in the report is that PhD courses could combine the equivalent of two years' chemical research with one year of formal instruction in, for example, technological economics, business management, operational research or marketing.

The committee therefore sees room at postgraduate level for undoing some of the effects of specialization at earlier levels, but it has few formulae to offer for changing university chemistry education. The report is, on the whole, a depressingly conservative document.

ATOMIC ENERGY

Turning Point for Dragon

WITH the first commercial application of the high temperature reactor (HTR) in the offing, the emphasis of research in the OECD Dragon reactor project has shifted steadily away from reactor development to problems of high temperature fuels and of control systems. The annual report of the project up to April 1970 shows that expenditure on reactor construction continues to diminish in an overall budget which rose by more than 12 per cent last year compared with 1968/69. Growth is unlikely to continue beyond 1971, however, and spending should fall below the present level by the time the agreement between the twelve countries involved expires in 1973. The expenditure in 1969/70 of £2.3 million brings the total cost of the project since its inception eleven years ago to just over £31 million.

A chief part of the Dragon programme is now centred on the use of the 20 MW experimental reactor at Winfrith as a test facility for industrially developed high temperature fuels. Previous work on the properties of coated fuel particles compacted in graphite matrices has been extended to include the testing of complete fuel assemblies suitable for use in future power stations. Among the recent innovations is the introduction of fuel elements in the form of large blocks of graphite with machined holes to carry tubular pins.

During the period covered by the report, the reactor was shut down for the fitting of new heat exchangers and secondary circuit pumps to increase the heat removal capacity. Although most of the work in the Dragon project is now centred on the testing of fuel and core materials, the approach of the first contract for an HTR for a power station—probably for Oldbury B—has focused attention on a host of important secondary problems affecting the HTR. The design of heat exchangers, gas circulation pumps and control systems are prominent among these. The chemical interactions between the graphite and the helium coolant are being studied as well as systems for monitoring and maintaining the purity of the coolant.

Various safety tests have also been carried out to ensure that the leak detection system for the pressure vessel is adequate for commercial usage. New information on the fracture mechanics for partially penetrating cracks has led to fresh studies of the detection system but the equipment was found to be quite efficient enough to reveal a crack before it reached anywhere near its critical length under the operating conditions of the vessel.