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Nuclear Medicine and Hot Atom Chemistry

Dr. Wolf's group has recently been awarded a large NIH grant for the study of the brain by means of radioactively labeled substrates which will be monitored using a positron emission transaxial tomographic scanner. The targets to be examined include dopamine receptors and opiate receptors. In conjunction with various medically oriented groups, biochemistry related to schizophrenia and senile dementia will be probed.

As usual, scientific progress in Dr. Wolf's group is moving along many fronts. A number of technical advances have been made including a procedure for purifying fluorine cryogenically for fluorination. Among the more chemically oriented work Dr. Wolf has done recently, he has performed a study on the reaction of fluorine with aromatics in which, under conditions where initial rates were measured, he was able to obtain an excellent linear free energy relationship for the fluorination process. Other fundamental studies accomplished recently include a hot atom study of ^{11}C in its reaction with acetylene. What Dr. Wolf has found is that the ^{11}C can be inserted into acetylene in the presence of D_2 without any scrambling between the hydrogens attached to the acetylene and the deuteriums present in D_2. A high yield of the ^{11}C-labeled acetylene was obtained. The mechanism by which this reaction occurs is of considerable

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current interest.

Dr. Fowler in Dr. Wolf's group has synthesized many radiochemicals for the study of the brain. She has developed rapid and effective procedures for the introduction of ^{11}C and ^{18}F into 2-deoxyglucose. These derivatives will be useful for brain metabolism studies. Additionally, Dr. Fowler has been engaged in preparing ^{18}F-labeled derivatives for the study of blood flow in the brain and also has done some elegant work on introduction of radiochemical labels into compounds used to probe brain receptors. For example, she has managed to prepare ^{11}C-labeled dopamine agonists and antagonists. The work which has been performed is elegant and efficient. Dr. Lambrecht, another of Dr. Wolf's co-workers, has done some very interesting new work in radionuclide production. Finally, Dr. Schlyer has examined the diffusion of CO_2 into coal using ^{11}C labeled CO_2 as a tracer for absorption studies. The studies being performed are related to the gasification of coal.

Overall, it is clear that Dr. Wolf's effort continues to be characterized by a sense of excitement and enthusiasm which is refreshing indeed. Although his research efforts are spread, it appears that he intends in the next few years to concentrate most of his work in the tomographic area where his studies are truly pioneering. The Chemistry Department at Brookhaven is fortunate indeed to have such a fine research program as that of Dr. Wolf.