

After these procedures, the reaction of 5 ml (0.05 mole)  $\text{CCl}_4$  with excess of Na in the autoclave is not unusually dangerous. Of course, all procedures dealing with high pressure reaction should be performed carefully. Experiments on a larger scale with regard to reaction between  $\text{CCl}_4$  with Na may be dangerous and need further investigation.

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#### The Advanced Tokamak

We disagree with Alexander J. Glass's assertion (Letters, 19 June, p. 1817) that the tokamak must be as large as the International Thermonuclear Experimental Reactor (ITER) to achieve sustained thermonuclear burn and that this does not bode well for the tokamak as a potential power-plant concept. In fact, recent advances worldwide indicate that smaller tokamak power plants should be feasible. In current, few-second experiments, heat transport within the plasma has been reduced by suppressing turbulence, plasma pressure limits have been increased, the potential for steady-state operation by naturally driven currents has been demonstrated, and concerns about handling exhaust heat have been mitigated. Integrating and extending these advances toward steady state is now a focus of international tokamak research. With such advanced tokamak physics, a smaller ITER, now being pursued internationally, would likely produce sustained plasma burn, and the tokamak power plant of the future becomes much more attractive.

After several decades of intensively competitive research on a broad range of magnetic fusion concepts, the tokamak emerged and matured into the only concept that is ready to produce the plasma conditions required to explore the next fusion science frontier, the physics of sustained burning plasmas. This is not to say that other concepts should not be investigated. On the contrary, they should be pursued to further optimize fusion power systems; physics understanding is transferable both ways. Our conclusion is that a strong experimental and computational tokamak research program with a healthy alternative concept program is the optimum fusion research strategy. We

strongly support the international construction of a tokamak burning plasma experiment as soon as possible. Fusion research is ready to enter the burning plasma era.

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#### Indian Science

I read with interest the letter from G. Padmanaban about "The Indian psyche" (10 July, p. 175). I fail to understand the correlation between general euphoria among Indians over recent nuclear tests and a feeling of Western alienation and bias among Indian scientists. The general public in India has little or no idea how the Western press depicts India. Hence, one cannot attribute the euphoria over nuclear explosions to Western alienation. Various points and personal experiences mentioned by Padmanaban are not specific to India or to any Indian scientist. They are common for anyone from a developing country.

The feeling of alienation and the sense of purposelessness among Indian scientists and academics have their historical roots in the policies pursued by post-independence India. After taking over the baton from the British, instead of revamping the educational system to meet India's societal needs, successive governments made few changes in the colonial legacy, mainly for political reasons. Under the British, a system was developed to produce lower-level Indian bureaucrats and technicians who would administer British rule and pursue British economic interests. Average Indians believed that an English education was the only passport to a successful job. Eventually, there was a "brain drain," with a mass movement of scientists and professionals to the West. With few exceptions, the kind of research undertaken by leading Indian universities and institutes today has nothing to do with the immediate societal, economic, or scientific needs

of India. With meager funding and bureaucratic controls, it is definitely not easy for Indian scientists to compete with their Western counterparts. Against this backdrop, an average Indian scientist can neither relate what he is doing to the immediate needs of his society, nor can he show his Western peers that he can do what they are doing in the West. India is fighting a relentless battle to eliminate social inequalities. The progress is quite impressive among illiterates, the semiliterate, and the middle-class public that span every sphere of Indian society. But there is something terribly wrong with a system that alienates a truly spirited Indian scientist both from the West and from his own society. True democratization and accountability to both government and society are needed.

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#### Response

I have so far received about 250 e-mails, mostly from Indians in the United States, to my letter of 10 July. I would like to respond in a broad sense. Nearly 95% of the messages agree with my analysis and state that India's image in the West is in general unfairly negative and that there is a feeling of alienation and discrimination even among scientists and professionals settled in the United States. About half a dozen letters from Indians in United States are critical of my analysis and state that it shows a defeatist mentality.

I was at the University of Chicago between 1973 and 1986 as a visiting scientist, and my visits are still continuing, so I can claim to have some understanding of the United States and Western society. In my letter, I was trying to emphasize that despite all its problems and defects, India has a certain resilience and inner spirit to make progress. Indian science, notwithstanding the existence of several substandard institutions, has started focusing on indigenous needs and the alleviation of human suffering. India has launched indigenous commercial recombinant hepatitis B vaccine production. An indigenous AIDS diagnosis kit is available, and three more are in the pipeline. A leprosy vaccine has been released for commercial use. A recombinant cholera vaccine is on the way. The Indo-U.S. Vaccine Action Program has led to a candidate rotavirus vaccine. India is a world leader in plant breeding and a major exporter of bulk drugs.

Does not India deserve a better representation in the West, supporting its struggle for progress?

A few American nationals expressed warm feelings for India and Indians and stated that on the basis of press reports that re-