environment

Where PCB's come from

Though scientists have known for a long time that the class of industrial compounds called polychlorinated biphenyls (PCB's) can have devastating environmental effects, no one has known just how they got into the atmosphere (SN: 10/24/70, p. 332). Now, in a paper presented to the American Chemical Society meeting this week in Dallas, Kenneth Moilanen and Donald Crosby of the University of California at Davis say they may have found an important new source.

Widely used in manufacturing as plasticizers, solvents and coatings, PCB's have been found in the atmosphere far from obvious industrial sources. The solution to this mystery, say Moilanen and Crosby, may lie in the breakdown of DDT through the action of sunlight. Under laboratory conditions, the Davis team has shown that ultraviolet light degrades DDT vapor into products that eventually become PCB's.

If true, this explanation would also solve another puzzle. "Since only a small fraction of the total amount of DDT ever applied has been accounted for," the paper says, "our results give clues about the eventual fate of DDT in the environment."

DDT apparently survives about four years in the atmosphere, plenty of time for the ultraviolet component of sunlight to accomplish its degradation. Other studies have shown that PCB may be twice as effective as DDT in causing thinning of bird eggshells. For this and other reasons, the researchers frankly describe their work as "exceptionally important."

Alternative power source

An alternative power source that could become competitive to existing fossil fuel and nuclear plants was proposed at the American Chemical Society meeting by United Aircraft Corp. fuel chemist Albert J. Giramonti.

Called COGAS, for Combined Gas and Steam Turbine Systems, the technique would use gas obtained from low quality coal or residual oil. The gasification and desulfurization processes would make the fuel expensive by today's standards, but as pollution controls tighten and technology advances, Giramonti said, COGAS stations would be able to compete economically with both nuclear and conventional fossil fuel installations.

Gasification involves partial oxidation of the raw material in a high-pressure reactor, followed by various scrubbing and absorption operations. Valuable elemental sulfur is produced as a by-product. The first COGAS stations could be built immediately with existing technology, Giramonti said.

Progress against solid wastes

Two new methods of attacking the persistent problem of what to do with solid wastes were introduced at the American Chemical Society meeting. Robert Groner, James Barbour and Virgil Freed of Oregon State University report successful laboratory transformation of wastepaper, straw and municipal wastes into particleboard that, they say, can compete in price and quality with interior plywood. They were also able to create fertilizer and a plastic-like cellulose acetate from solid wastes. In another paper, Ronald Wolk of Hydrocarbon Research, Inc., reports a process to recycle old tires into fuel oil, naphtha and raw materials for use in making new tires. The development comes none too soon, for recent pollution legislation forbids burning tires, and piles of old tires have become a growing nuisance.

astronomy

Getting to the heart of NGC 253

The centers of galaxies are of special interest because galactic nuclei appear to be places where a number of strange astrophysical phenomena take place. In the April 1 ASTROPHYSICAL JOURNAL LETTERS E. E. Becklin and Gerry Neugebauer of California Institute of Technology and E. B. Fomalont of the National Radio Astronomy Observatory report observations in radio and infrared of the central regions of the galaxy NGC 253.

At both the infrared and radio frequencies the galaxy exhibits a nuclear core that extends for about 10 seconds of arc across the sky. The nucleus shows a high infrared flux, so high that the observers believe it cannot be attributed to a nonthermal source. They believe that it is thermal radiation from dust that has been heated by stellar ultraviolet light. If that is so, and if it is true at the same time, as other observers maintain, that certain other galaxies have nonthermal infrared sources in their nuclei, then a complication is added to the study of galactic nuclei: There must be more than one mechanism responsible for their infrared emanations.

Mysterious motions in the Venus atmosphere

Carbon dioxide is a major component of the atmosphere of the planet Venus, and therefore studies of its behavior can give information on large-scale happenings in the Venusian atmosphere.

Twenty years ago G. P. Kuiper noted day-to-day variations in the strength of the absorption by carbon dioxide of a particular band of wavelengths from sunlight. Now the matter has been taken up by L. G. Young, A. T. Young, J. W. Young and J. T. Bergstralh of the Jet Propulsion Laboratory in Pasadena, Calif. They report in the April 1 ASTROPHYSICAL JOURNAL LETTERS that there is a 20 percent variation of the strength of the carbon dioxide absorption over a period of about four days.

This appears to be evidence of a change in the level of the cloud tops that amounts to more than one kilometer and occurs simultaneously all over the planet. The observers are at a loss to explain this phenomenon since a great deal of energy is required for such changes, and they don't see where it comes from on a planet that rotates as slowly as Venus and absorbs solar energy at a uniform rate at all locations. "We seem to be observing a fundamental feature of the atmospheric dynamics that is not explained by current theories of atmospheric circulation on Venus," they conclude.

Bode's law again

Bode's law is an empirical formula for calculating the distances of the planets from the sun. Many attempts have been made to explain it by some physical principle. In the March 30 NATURE Myron Lecar of the Smithsonian Astrophysical Observatory and Harvard College Observatory suggests that Bode's law may be based on the fact that planets cannot form "too close to one another." If, in the original solar nebula, two planets had begun to form too close to each other, they would have competed for the same matter and would either have coalesced or not have grown. Lecar says Bode's law can be determined by a sequence of random numbers subject to the closeness constraint. Satellite systems (such as Jupiter's or Saturn's) could have formed with closer spacing, he says, since they did not grow to the size where they accreted gas and thus formed from less material and so could be closer together.