

# chemistry

Gathered at the American Chemical Society meeting in Atlantic City

## COSMIC CHEMISTRY

### Age of the universe

The universe is 6.5 billion years old, says Prof. V. E. Viola, Jr., of the University of Maryland, making it 1.5 billion years older than some of his colleagues have calculated. The figures are based on a comparison of present abundance of radioactive nuclei of thorium and uranium against maximum past abundances, calculated from the big bang theory of the origin of the universe.

Dr. Viola says some of the radioactive species concerned are more unstable than previous calculators thought—hence the difference in estimated ages.

## INFORMATION RETRIEVAL

### Substructure searching

There are about four million chemical compounds known; about 100,000 new ones are reported in the world's chemical literature each year.

The situation is further complicated because methods of naming compounds are not uniform throughout all fields of chemistry.

To ease the problem, the American Chemical Society's Chemical Abstracts Service has developed a technique called substructure searching. It will search the files of the chemical registry system, a computerized collection of data that will eventually record the structures, names and sources of published information for virtually all known chemical compounds.

The system is based on a detailed listing in machine language of all the atoms, and the bonds between them, that make up the structure of the molecule. The computer itself generates this listing from a representation of the compound's structure that is put into its memory by a special structure-typing keyboard.

Through the substructure system, the computer can find all compounds that possess any feature of structure of interest to an investigator, from a whole molecule to any small detail.

## POLYMERS

### Heat-resistant copolymers

A series of copolymers of superior heat resistance, capable of being spun into fibers or cast into film, have been reported by chemists of the Monsanto company. Monsanto's Dr. Jack Preston was chairman of a symposium on fibers of thermally resistant organic polymers. Others who reported were Drs. W. Bruce Black, John R. Holsten, Marvin R. Lilyquist, Stephen S. Hirsch and Hartwig C. Bach, all of Monsanto.

The new polymers get their heat resistance from arrangements of small combinations of atoms that form the molecule's building blocks, called monomers, in a predetermined order.

One such polymer, the Monsanto chemists claim, has the highest resistance to oxidation at high tempera-

tures of any polymer yet disclosed. In another important test, fibers of one of the ordered polymers retained 36 percent of their room-temperature strength at 500 degrees C.; fibers of another retained more than 80 percent of their room-temperature strength after seven weeks' exposure to temperatures of 300 degrees C.

Another aspect of the Monsanto work reveals that the thermal stability of ordered polymers can be enhanced by heat treatment in air. Fibers so treated can be heated in a gas flame without burning.

None of these fibers are yet commercially available.

## COLLOIDS

### Measuring air pollution by eye

A method of measuring the pollution of the air by the distance a person can see has been developed by Prof. R. J. Charlson of the University of Washington in Seattle.

Research shows, he says, that when fog is absent there is a relation between the concentration of solid particles in the air and the visual range. Using this relation, a technician can gauge the amount of pollution by taking a simple measurement of the visual range.

For example, to maintain the five kilometer visual range required for aircraft operations under Visual Flight Rules there would have to be less than about 240 micrograms of particulate matter per cubic meter of air.

## METEOROLOGY

### Rainmaking with asphalt

Coating patches of ground with asphalt could make rainfall, says Dr. M. A. Estoque of the University of Miami.

Blackening a relatively large land surface this way creates an area of intense local heat. In principle, this can set up convection currents in the air above the asphalt, and these can produce clouds and then rain.

Dr. Estoque points out a natural example: the formation of clouds over islands in the daytime. The surface of the islands is heated more than the surrounding sea by the sunlight, and clouds and showers often are formed over them.

In particular, Dr. Estoque made a study of the effect of daytime heating of Anegada Island, a two-by-ten mile piece of land in the Caribbean, and found that it produced showering clouds on a day when there were generally none in the surrounding regions.

A computer model is being developed to determine whether such an effect could be expected from extensive asphalt pavements on a strip of land about six miles in width. Although the work is still in its initial stage, Dr. Estoque says, "Asphalt coatings could definitely increase rainfall in many regions of the earth." This would be especially likely, he feels, in places where rain is often on the verge of falling but lacks a small impulse to trigger it. Asphalt could provide the trigger, he says.

28 september 1968/vol. 94/science news/313