

CHEMISTRY

Origin of Solar System

Chemist, geologist, astronomer and physicist can reconstruct the process of earth's formation. Cheap grain alcohol can be made from wood waste.

► RECORDS OF the formation of our solar system have not been destroyed. Dr. Harrison Brown of the California Institute of Technology told the meeting of the American Chemical Society in Buffalo, when he received the Society's award in pure chemistry.

Explaining his chemical theories of the origin of our solar system, he said we have only to learn to read these records correctly. The chemist, the geologist, the astronomer and the physicist, working together, can successfully reconstruct the process.

Two groups of planets which differ dramatically in their weights and densities move around the sun. The atmospheres of these planets also differ. Carbon dioxide in the atmospheres of Venus, earth and Mars tells astronomers and chemists that carbon is highly oxidized on these inner planets.

In contrast, the sun's giant outer planets, Jupiter, Saturn, Uranus and Neptune, have methane in their atmospheres, and at least on Jupiter there is an appreciable quantity of ammonia. This means that carbon exists there in a highly reduced state. Opposite kinds of elements are believed to make up the bulk of these two kinds of planets, the heavier metals compose earth and the other dense, solid inner planets. Outer planets are so light that they must be made largely of gases with hydrogen and helium predominating.

What conditions, Dr. Brown asked in his address, would the chemist recognize as necessary to form such a series of planets, supposing our universe to start with the average composition of cosmic matter?

Three groups of elements and compounds could exist, according to Dr. Brown. Those easily condensable would contain metals, oxides and silicates, a small fraction of the whole. Such materials make up the inner planets. Elements and compounds of intermediate condensability include water, ammonia and methane. Jupiter must have been in the best position to take up the bulk of such material.

Left over are hydrogen and helium which would not condense at the temperature of space. These light elements were not so much lost from planetary atmospheres as not captured at the time of formation.

Air and water must, according to this theory, be of secondary origin, formed by reactions among the elements present after the formation of the planets similar to earth. These include not only the inner group but also Pluto, the farthest of the planets. Interpretation of the possible chemi-

cal reactions would allow scientists to read the conditions which must have been present to account for the chemical facts now evident in the solar system.

Alcohol From Wood Waste

► GRAIN ALCOHOL can be made from wood waste at less than one-half the price of production from black strap molasses, Dr. Nathan Gilbert of the Tennessee Valley Authority announced at the meeting.

In the process sawdust and chips are treated by continuous percolation with dilute sulfuric acid. This results in a material similar to molasses which can be used without concentration for cattle feed and for the production of grain alcohol.

Operating difficulties have been overcome, Dr. Gilbert said, and the new process is now in production.

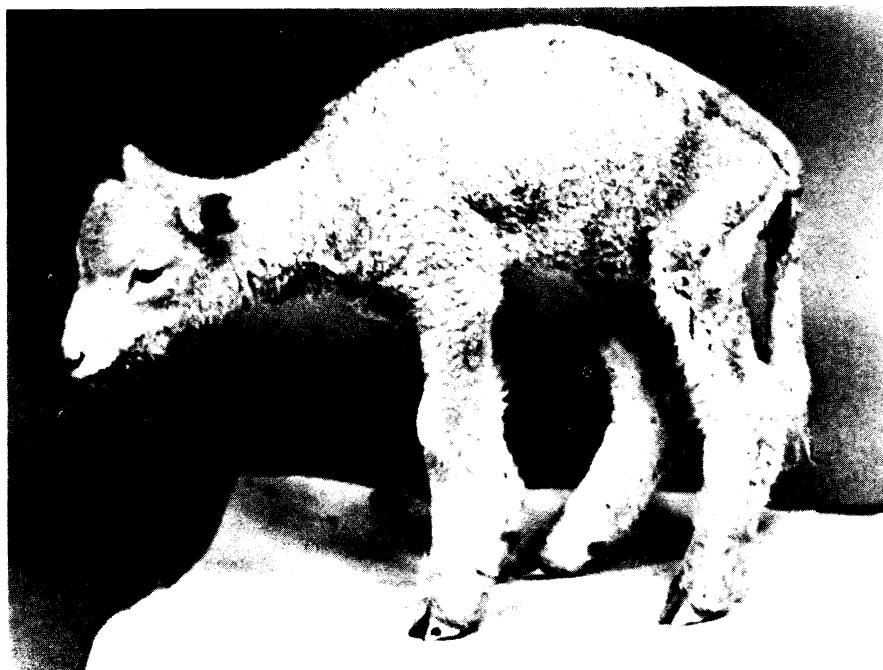
An end to danger from sweaters bursting into flame is promised in a report by

Prof. James M. Church of Columbia University, New York. New organic chemicals which contain phosphorus make fibers fireproof but avoid the trouble of losing the fireproofing material in the wash. Sweaters and other rough textured materials treated with the new fireproofing chemicals can now be worn and washed with assurance that, if a cigarette ash should set fire to the garment, the heat will transform the fireproofing compound clinging to the fibers into phosphoric acid which will efficiently smother both flames and afterglow.

Antibiotics such as penicillin are more efficient in promoting the growth of chicks than are either germicides or detergents having the same kind of effect in the chick's body.

This is found by Dr. Joel R. Stern, Joyce C. Gutierrez and Dr. James McGinnis of the State College of Washington. The scientists are investigating the belief held by some farmers that stimulation of growth by penicillin is the result of mechanical action in killing off harmful bacteria in the chicken's intestinal tract. Dr. Stern and his group reported that the effect of the antibiotic is greater than that produced by much larger quantities of chemicals not of antibiotic origin.

Plutonium, man-made atomic bomb element, builds itself into the bones when it is absorbed by the body, but does not replace the calcium of which the bone is made. The addition to knowledge about



FEWER SICK LAMBS—More lamb chops, veal and steaks may come from research by the American Veterinary Medical Association. Thousands of lambs and calves that would otherwise die this spring from "white muscle" disease may be saved by a new drug containing alpha tocopherol, most potent form of vitamin E. A sick lamb is shown here.

the action of this poisonous and radioactive element was reported by Walter E. Kisesleski and Austin M. Brues of Argonne National Laboratory, Chicago. Fifty-five percent of the plutonium injected is still retained by the body 265 days later, mostly in bone.

Make New Hydrocarbons

► NEW SOURCES of aviation fuel spur chemists to create hot-burning liquids economical to manufacture. R. M. Caves and R. L. McLaughlin of the Mellon Institute, Pittsburgh, and P. H. Wise of the National Advisory Committee for Aeronautics, Cleveland, reported to the meeting on their success in making a series of such compounds.

Linking together substances similar to carboric acid and hydrocarbons derived from propane, these chemists get a satisfactory amount of new hydrocarbon compounds in a series of three diphenyl alkylpropanes and the corresponding dicyclohexyl compounds.

Thirteen new organic compounds never before reported were described at the same meeting by George F. Lewenz of the Lewis Flight Propulsion Laboratory, National Advisory Committee for Aeronautics, Cleveland, and Kasper T. Serijan, Armour and Co., Chicago. An additional 22 new compounds of another series were prepared by this team, in a program to provide samples of known structure with which to compare chemicals to be identified in the future. The chemists described their methods of making these new additions to the aromatic series of organic compounds.

Warn of Smog Poisons

► DANGERS DUE to ordinary poisonous chemicals can now be detected by monitoring devices worn by workers exposed to them, just as atomic workers carry small instruments to detect radioactivity.

A new safety device for this purpose was described by Gordon D. Patterson, Jr., of Du Pont and Dr. Melvin G. Mellon of Purdue University, reporting their work on air pollution to the meeting.

Sulfur is the element blamed for smog and similar industrial fume problems. The indicator described by these chemicals turns yellow, green or blue according to the amount of sulfur compounds in the air. The colors appear in vanadate-silica gel which is packed into a glass tube. One of these tubes can be worn by each worker. Other tubes can be used to analyze stack gases.

An alternate detecting material, periodate-silica gel, also used in the new indicator tubes, changes from white to pink and then to red brown when there is sulfur dioxide in the air.

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More than 600 children a year, almost all under four years of age, lose their lives through accidental poisoning.

MEDICINE

Detection of Cancer

Catching enemy when invasion is still small and localized is important part of fight against cancer. Seven danger signals listed.

(Second of a series of five articles on what can be done about cancer)

By JANE STAFFORD

► DETECTING CANCER as early as possible is an important part of the fight against the disease. You can easily see why when you understand the nature of cancer. It is abnormal growth which invades and spreads not only into surrounding parts of the body but also to distant parts.

Obviously, the chance of victory, in this case cure, is better when the enemy is small and localized in just one place. It is important to remember, also, that this abnormal growth, invasion and spread can and often does go on at a very rapid pace.

Cancer detection is very much a two-way job. The patient cannot tell by himself that he has cancer. But the doctor cannot tell until the patient comes for examination. For the patient, man or woman, there are certain symptoms or signs that should be considered danger signals. These are:

1. Any sore that does not heal.
2. A lump or thickening in the breast or elsewhere.
3. Unusual bleeding or discharge.
4. Any change in a wart or mole.
5. Persistent indigestion or difficulty in swallowing.
6. Persistent hoarseness or cough.
7. Any change in normal bowel habits.

These signs do not mean that a person necessarily has cancer. But the person who has any one of them should see a doctor to find out what is wrong, whether cancer or some other condition, and have it corrected.

These seven danger signals, as they are called, are the most frequent first expression of the commonest kinds of cancer.

Many persons have been told that early cancer is painless, that they should not wait for pain to drive them to a doctor. The last half of this is true. The first half is not necessarily so. Even a very small cancer, if located close to certain nerve endings, may cause pain or at least some kind of sensation of something not quite right or comfortable. "Heaviness," "pricking," "tightness," "soreness," and similar kinds of sensations may be felt even if real pain is not. If this kind of sensation goes on for more than a few weeks and if it is localized enough so that a person can, literally, put a finger on the place, then it should be investigated carefully by the doctor.

Being alert to these various signs and sensations that may mean cancer are the lay person's part of the cancer-detecting job.

The doctor's part of the job starts with a careful history of how the patient feels, all his symptoms and the ailments he and his parents have had. Then comes examination and if the suspected cancer is inside the body where the doctor cannot see or feel it, X-ray examinations may be made.

If cancer is still suspected, the doctor will probably want to clinch the diagnosis by a biopsy examination. This means examination under the microscope of material from the suspected cancer. This may be done by cutting out a piece from the edge of the growth, including a piece of normal tissue for comparison. Cutting out the piece of tissue is done painlessly with the aid of an anesthetic. The shape and arrangement of the cells, their organization and nucleus tell the expert who looks at them under the microscope whether or not they are from cancer.

In recent years a new microscopic test for diagnosing cancer has been developed. It is known as the smear test, the Papa or Pap test and the Papanicolaou test, because a scientist named Papanicolaou developed it. This test is based on the fact that cancers shed cells as trees shed leaves. These cells get into the body fluids of certain organs. Isolated lung cancer cells can be detected in the sputum and cells of cancer that has attacked the uterus can be detected in material smeared on a slide that is gently swept over tissues at the opening from the uterus. Cancer cells also have been found in stomach juice from patients with stomach cancer.

Since in this test the scientist must make his diagnosis on the basis of only a few cells, great skill and experience are required. A method that uses electronics to speed examination of material in this test has recently been developed and should make the test more widely available.

Because cancer often develops silently with very few symptoms in its early stages, many patients still are lost who could be saved by earlier diagnosis and treatment. In these cases it is not always the patient's delay or the doctor's that brings treatment too late. To help prevent this tragic loss of life, men and women who reach the age of 40 and 35 respectively are urged by many cancer authorities to have yearly or twice-yearly examinations by their doctors. The hope is that these men and women, who have reached the age when cancer most often attacks, will have their cancers detected in early, symptomless stages.

A cancer detection test that could be given as easily as the sugar test for diabetes