PHYSICS

Stop Atomic Pile Clogging

Study of how tin atom changes from stannous to stannic form is effort to find way to eliminate fission by-products that can halt pile reaction unless removed.

➤ ATOMIC PILES of the future may be able to run without becoming clogged by fission-produced by-products, including tin, if research now underway in Michigan State University's chemical laboratories succeeds.

Dr. Carl H. Brubaker Jr., assistant professor of chemistry, is studying how the tin atom changes from stannous to stannic form in an effort to determine the exact nature of tin and tin compounds.

Dr. Brubaker's study concerns the fundamental nature of the tin atom. He uses a spectrophotometer, that gives some indication of the nature of the change from stannous to stannic form by measuring the amount of ultraviolet light transmitted through or absorbed in the solution at various states.

An Atomic Energy Commission grant supports Dr. Brubaker's project. The AEC is interested in tin because of difficulties in eliminating by-products from atomic piles.

Atomic fission produces some 34 elements, one of which is tin. If these elements are not removed, the uranium becomes clogged and diluted, causing the pile reaction to stop.

In dry atomic piles, it is usually possible to pull out a little contaminated uranium at a time, remove the tin and other by-products, reprocess and reinsert the uranium—all without stopping the pile.

In piles run in solution, it was originally necessary to stop the reaction completely to remove the tin. Now scientists often pump in new solution while pumping out old, without stopping the reaction. This does not completely remove by-products and eventually liquid piles must be stopped and impurities eliminated.

Atomic chemists want not only to remove radioactive tin from piles, but to remove it in a pure state so it can be used in tracer experiments. Tin recovered from an atomic pile is purer and easier to work with than is natural tin, which is often associated with other elements that confuse experiments.

Radioactive tin is used for metallurgy research to study tin compounds, for tests on tin corrosion and to study changes in the tin atom.

Dr. Brubaker also has thermostatic baths and refrigerated equipment to measure effect of temperature in inducing chemical reactions. The baths are accurate within 1/200th of a degree Fahrenheit. When gauges indicate temperature is about to fall, powerful infrared heat lamps flash on.

Surprisingly little is known about tin, the chemist stated. In its stannic form, tin has a valence of four, while its valence in stannous form is two.

Since valence measures the extent to which an atom is able to combine with others, this means that the combining power of the stannic type is greater. But chemists have never been able to learn exactly what happens when the element changes from one form to the other.

Science News Letter, April 14, 1956

ENTOMOLOGY

Foresee Elimination Of Insect Pests

➤ COMPLETE elimination of insect pests rather than mere control of them is foreseen by T. L. Aamodt, in testimony before a House appropriations subcommittee.

Mr. Aamodt, who is Minnesota's state entomologist, said scientists had reached the point where they could consider eradication of certain pests, such as the golden nematode and the soybean nematode.

Arguing for support of a stepped-up attack on the gypsy moth, Mr. Aamodt noted the program could be used as a test for eradication of other insects.

The gypsy moth, a two-inch, red-tufted bristled caterpillar, is advancing southward and westward from New England at an alarming rate. It recently made the "long jump" across the Berkshire Mountains to Lansing, Mich.

Thus there is at present no natural barrier to the destructive insects' spread throughout the Midwest, Mr. Aamodt said. Scientists had thought the gypsy moth was being successfully confined to the Northeast, but it has now broken bounds to infest a 30% larger area, nearly 9,000,000 acres in New York, New Jersey and Pennsylvania.

Strong winds associated with hurricanes probably aided its spread.

The insect, now a serious threat to forest, fruit and shade trees from the East Coast west to the Great Plains, can be eliminated from any given area at a reasonable cost, Mr. Aamodt said. He urged immediate appropriation of $1,500,000 for control work this spring, noting that an acre of land can be sprayed for each dollar allotted.

Mr. Aamodt predicted it would not be "many years" before $1,500,000,000 would have to be spent for control only if sufficient money was not appropriated immediately.

Science News Letter, April 14, 1956

DUST DAMAGE—This is what tiny dust particles could do to the surface of a missile or space satellite when the specks bombard the metal at tremendous speeds and the heat of the impact erodes the metal, tests being conducted at Armour Research Foundation show.

PHYSICS

Dust Particles May Be Threat to Space Travel

See Front Cover

➤ THE DESTRUCTIVE effect that might be caused by airborne dust particles striking against the hull of a space ship is being measured by scientists at the Armour Research Foundation of Illinois Institute of Technology, Chicago.

Particles of dust so small as to be almost invisible to the naked eye are shot against an aluminum plate. A shock tube is used to propel the particles at speeds up to 4,000 feet a second, simulating conditions in outer space. In the picture on the front cover of this week's SCIENCE NEWS LETTER the flying specks of dust give the effect of threads of light as they bounce off the metal plate.

Millions of dust particles striking the surface of a satellite vehicle can cause extensive damage to the metal.

Another source of damage to guided missiles and satellites is the erosion of metal surfaces by the intense heat generated by the friction of the air against an object in flight. This heat can cause severe damage to the exterior of the missile, create higher air resistance and thus increase the heat transfer. If the heat becomes great enough, it could vaporize at least the outer surface of the missile or satellite.

Science News Letter, April 14, 1956

There are many diseases that cannot spread unless carried by *insects.*

"Rockoons"—rockets released from balloons at top of ascent—will make scientific measurements in the upper atmosphere.