PHYSICS

Nature Simulated As X-Rays Explode Hearts of Lead Atoms

X-RAYS, directed by mere human agencies, can now make the heavy heart of metallic lead atoms explode and disintegrate, upsetting belief and experience in physics that atomic breakdown is nature's own show incapable of control by man.

A Russian scientist, Prof. G. I. Pokrowski of the All Union Electrotechnical Institute, Moscow, has just reported to the American Physical Society that a weak radioactivity is acquired by some of the heavier chemical elements after they are irritated by X-rays. Their atoms fly to pieces in a manner similar to the disintegration of spontaneously radioactive radium.

This suggests a new method of investigating the central nucleus of the atom, which may possibly give science some way of releasing the vast stores of energy that some scientists believe are wrapped within the nucleus.

Prof. Pokrowski found that speeding corpuscles similar to the alpha rays of radioactive substances were emitted for more than an hour by samples of lead after they had been exposed 30 minutes to X-rays. A Coolidge X-ray tube, with tungsten anode and a pressure of 140,000 volts, was used to produce the X-radiation.

Scintillations on a sensitive screen formed by the impact of the atomic bullets were employed to count the particles ejected from the lead nuclei. The ionization or increased electric conducting power of the air in the neighborhood of the lead was also used as a measure of the activity.

Prof. Pokrowski first found that the artificial disintegration fell off after the removal of the stimulating X-rays; so in later experiments observations were made a fourth of a second after exposure. Larger activities were produced by longer exposure to the rays.

About a millionth of an erg was the energy of the corpuscles. This makes it very likely that they come from the nucleus of the atom and not from the outside coatings. This amount, however, is much less than the energy of ordinary alpha particles from radium.

This effect has been found only with heavier atoms, and this agrees with an earlier prediction of Prof. Pokrowski that disintegration can occur only in atoms of atomic number above forty.

The relativity theory shows that when atoms whose total mass is smaller than the disintegrating atom are produced, energy will be available for producing such penetrating rays as those observed in Moscow. Not all of the lead atoms are open to this kind of behavior, is the conclusion drawn.

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ENTOMOLOGY

Pine Tar Oil Spray Kills Insects and Checks Fungi

A POISON SPRAY that cuts both ways, killing insects and checking the fungi that cause plant disease, has been made possible by the improvement of pine tar oil distilled from "fat" stumps and old logs in the southern states. It has been made the subject of study by Dr. E. R. De Ong, consulting entomologist of San Francisco.

The light oil that comes off after wood turpentine has been distilled out of these forest waste products has long been known to possess insecticidal value. But it has hitherto been unsuited for general use on plants because it contained acids that poisoned the foliage and penetrated into the deeper tissues, often causing death. New processes now eliminate the acids, making the oil harmless to plants. The process is said to be commercially practicable.

Pine tar oil can be used for carrying various insect poisons, and in itself has insecticidal properties. Furthermore, it dissolves the wax on leaf surfaces, penetrating to the leaf tissue itself and carrying the dissolved insect poisons into more intimate contact than can be achieved with the usual petroleum spray bases. And since it is more volatile than the petroleum derivatives, it evaporates before it does the foliage any harm. When used where slower evaporation is desired, it may then be combined with any petroleum fraction.

A decided advantage claimed for pine tar oil as a spray base is its ability to carry copper resinate in solution. Copper resinate is a compound of copper and resin, highly toxic to disease-producing fungi. Here again the ability of pine tar oil to dissolve the waxy covering on leaves comes into play, making it possible for the fungicide to reach the tiny accidental cracks and the minute breathing pores through which fungi usually gain entrance to the leaf.

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ENTOMOLOGY

Latest News Received of Ancient Stellar Explosion

WORKING in an observatory at Cape Town, an astronomer has just learned the latest news concerning an explosion that occurred nearly 2200 years ago, when ancient Carthage was at its height. The scientist is Dr. H. Spencer Jones, His Majesty's astronomer at the Cape, and the explosion was in a star in the constellation of Pictor, the painter, which cannot be seen from northern latitudes. So distant is the star, according to Dr. Jones' calculations, that its light takes about 2173 years to reach the earth, so that the first word of this ancient explosion arrived in 1925, when a bright star was suddenly noticed where a faint one had been seen before.

Dr. Jones has also calculated the actual brightness, or candlepower, of the star when it was shining most brightly, and this indicates that it was then about 150,000 times the brightness of the sun. Also, he finds, it suddenly increased in size. Before the explosion, it was only about eight-tenths as large again as the sun, but at the maximum it was 384 times the sun's diameter of 92,900,000 miles, making it about 350,000,000,000 miles in diameter. About this time, two shells of gas were thrown off, which travelled outward with a speed of as much as 76 miles a second for the inner shell, and 206 miles a second for the outer. Then the star began to decrease in size, its diameter diminishing at the rate of 12½ solar diameters every day. Now it is seen nearly as faint as before the explosion.

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