

NUCLEAR PHYSICS-MEDICINE

Atom Age Hypo Syringes

Lead-enclosed syringes are protecting scientists from harmful radiation to which they are exposed while treating patients.

➤ HYPODERMIC syringes for the atomic age are getting coatings of lucite and even lead.

Exposure to radioactive chemicals day after day can cause serious injury and shorten life. Patients getting the chemicals for treatment do not get the daily, life-long exposures. But X-ray and radium specialists who give the treatments might. And because such chemicals are being used more and more, there is increasing danger to the specialists giving the treatment or using them in the search for better methods of treating disease.

Radiogallium, one of the newer radioactive chemicals under study for its possible use in bone diseases, gives off such strong gamma rays that dense lead shielding of the hypodermic syringe proved necessary to protect the scientist studying it.

Shields of this type, for standard hypodermic syringes from very small ones an inch and a half long to big jobs measuring almost seven inches and holding about an ounce of fluid, have been designed by scientists at the Naval Medical Research Institute at Bethesda, Md. The lead-shielded syringes are a little awkward to handle, since they weigh about four and one-half pounds and are very much larger than the ordinary glass syringes. At the Naval Hospital where they have already been used for injections in patients, doctors avoid the difficulty by first inserting in the vein a

hypodermic needle attached to a rubber tube used for giving salt or sugar solution. The needle of the lead-shielded syringe is then inserted into the rubber tubing.

A slot milled in the lead shield lets the doctor see the level of fluid as he draws it up into the syringe and whether there are air bubbles in it. A dark-colored solution of the radioactive chemical makes it easier to see the fluid level, bubbles and so on, and for the same reason the inside surface of the shield is coated either with a phosphor activated by radioactive emanations or with some luminous dial paint.

The lead shielding cuts the amount of rays reaching the doctor to well below the amount considered a safe daily dose.

For radioactive chemicals that emit alpha and beta rays instead of gamma rays, a two-piece shield of the plastic, lucite, gives enough protection to the hands of the doctors. These chemicals include two kinds of carbon, iron, phosphorus, sulfur, copper and strontium.

Details of the shield designs are reported in the journal, *SCIENCE* (July 1), by Comdr. H. C. Dudley, J. F. Bronson and R. O. Taylor of the National Naval Medical Center. The shields are not yet on the market. Comdr. Dudley and associates have applied for a government patent and will make the design public property so that any manufacturer can make them

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NUCLEAR PHYSICS

AEC Inventories Atoms

➤ INVENTORY problems involving uranium 235, it is suggested by the Sixth Semi-Annual Report of the Atomic Energy Commission, just released, are by no means as simple as those faced by King Midas of the golden touch.

The legendary king, who transformed all his surroundings, including his courtiers and his young daughter, into gold, had only to store his wealth in a vault and keep track of the tonnage on hand.

Present day alchemists have their assay problems infinitely complicated by the fact that they cannot lock up their treasure until they are ready to use it. Their trouble is not in changing one heavy metal into another. That process goes on spontaneously. Their difficulty comes in determining how much of which metal is in any one container at what moment.

Their material is not only in constant

state of change, but it is accompanied by radiation in deadly quantities and end-products that are fantastically poisonous. It is often impossible to get close enough to the material to assay it at all.

The Atomic Energy Commission announces in its report completion of the first part of its program to account for stocks of radioactive material in its modernized bookkeeping system. Perpetual inventories of such materials have been established, even though the materials themselves are far from permanent.

If a banker had to keep accounts in a world where gold dollars in his vaults slowly changed into copper pennies, and some of his coins were in liquid and gaseous form, as well as metal, he would understand better the problems of cost accounting among the atoms. The Atomic Energy Commission points out that their

accounting system is unique, yet they have succeeded in devising a unified system applicable to all industrial organizations contracting with them on atomic energy research.

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CHEMISTRY-ENTOMOLOGY

Outmoded Phonograph Helps in Testing Insecticides

➤ EVEN though your family may have long ago discarded that old style phonograph, the one which played wax cylinder records, the U. S. Department of Agriculture is putting this out-of-date instrument to good use, in money-saving tests of insecticides.

Replacing the record holder of the phonograph with a screen cage, the Department scientists place a white mouse in the cage, turn the crank several times, and give the mouse a shower bath as it is rolled over and over. The shower is not of water, however, but a sprayed insecticide solution. The entomologists use this device in searching for a chemical which will prove effective in



LEAD-SHIELDED SYRINGE—Comdr. H. C. Dudley of the Naval Medical Research Institute fills a lead-shielded standard hypodermic syringe with a radioactive chemical solution. In front of the lead-guarded container is an ordinary hypodermic syringe of about the same capacity, one-third of an ounce, as that he is filling. The syringe at left on the tray is shielded in lucite. The tube showing inside his glove is an electroscope for detecting the amount of radiation getting to his hands and body.

the control of stable flies and other blood-sucking flies and mosquitoes.

After the shower bath, while still tumbling in the cage, the mouse is blown dry by air. The next day the mouse is caged with 20 stable flies. If as many as four of the flies succeed in attacking the mouse, without being poisoned or driven off, the insecticide is considered worthless, and full scale tests on cattle or other livestock are unnecessary.

Hundreds of chemicals, both new synthetics and modifications of well-known older insecticides, are being tested in this manner to find those that will kill or repel the harmful insects, yet will not harm the

animals. Experience has shown that the farmer is amply repaid for the cost of the insecticide in the increased milk production and weight gains of cows which are protected from stable flies and other pests.

The preliminary test of the insecticide on white mice not only demonstrates the effectiveness of the chemical but it is much cheaper to perform, requires a significantly smaller amount of material, and results are obtained more quickly than in full-scale tests. If the tests prove the insecticide to be effective for white mice, full scale investigations of the formulations are made on cattle, horses, and other livestock.

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PSYCHOLOGY

Suggest Way to Survival

➤ A SCIENTIST who is worried that we may destroy ourselves has come up with some rules for effective living—and the survival of man.

Dr. Kenneth E. Appel of the University of Pennsylvania Medical School warned that the crime waves, alcoholism, mental illness and increasing divorce rates may be pointing the way to man's destruction. But there is hope if we learn to live with others.

The scientist discussed the future of man as a guest of Watson Davis, director of Science Service, on Adventures in Science, heard over the Columbia network.

Here are Dr. Appel's rules for effective living:

"Don't aim for happiness alone, or even make it your chief objective. The mature individual does not strive always for happiness. There is a higher contentment and peace of mind that may involve unhappiness, effort and even suffering that can be assimilated by the mature mind. There are stakes, goals, rewards and values in the struggle of life that are higher than individual happiness or comfort.

"Don't shirk work. Do something worthwhile. Pull your load unless you are sick. Many people have been deprived of one of the basic satisfactions of life, because

circumstances have prevented them from cultivating the habit of effort and achievement, however humble.

"And do things that need to be done or have to be done by somebody, regardless of your immediate feelings.

"Get along and cooperate with others. Work in an organization. You must learn to work for a time even under unfair and unpleasant authority. Stand for frustration, failure, mistakes, disappointment and always carry on—whether the frustration be of your ambition or in your personal relationship with others.

"Take responsibility. Show independent initiative. Be self-decisive, self-moving, self-directing.

"Absorb frustration and failure without developing handicapping, disintegrating tensions of fear, anger, depression, suspicion, blaming others, withdrawal, or undue bodily disturbances associated with intense emotion.

"And you should show devotion, effort, and love to something beyond yourself. Such are the qualities of emotional, mental or personality health that we all—fathers, mothers, children, society—have to cultivate. And it is possible for all of us continually to improve our capacities in these regards.

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ASTRONOMY

Nebulous Star Groups?

➤ RED LINES discovered in spectrograms made at Mexico's National Astrophysical Observatory at Tonanzintla may help settle an astronomical puzzler.

The red lines, made in the spectrum of faint nebulous objects in the famed Andromeda nebula, indicate the presence of hydrogen. And the hydrogen indicates that the objects may be planetary nebulae or nebulous star groups like the Pleiades, but not globular clusters, as has previously been

suggested by some astronomers.

The new spectrograms were made with the wide-eyed Schmidt telescope at Tonanzintla which boasts the largest prism in the world, 26 inches in diameter. Dr. Guillermo Haro, director of the Mexican National Astronomical Observatory at Tacubaya and a member of the research staff at Tonanzintla, made the discovery, which was reported in a communication to Dr. Harlow Shapley, director of the Harvard

College Observatory, from Dr. Luis Enrique Erro, director of the Tonanzintla Observatory.

"The new result from Mexico shows definitely that at least some of the objects are not typical globular clusters," Dr. Shapley commented.

Two astronomers, Drs. Edwin P. Hubble and Walter Baade, both of Mount Wilson Observatory, had tentatively speculated that the objects were globular clusters.

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ENGINEERING-CHEMISTRY

Add Nothing to Paints Is Advice of Expert

➤ ADDING a little of this and a little of that to modern household paints may entirely change their characteristics, the amateur painter was warned by E. D. Peck of the Pittsburgh Plate Glass Company.

The numerous superior paints that have been developed since the end of the war are in specialized categories of composition, performance and application, he said. Synthetic resins and specially processed oils now used by practically all paint manufacturers are not always compatible with the old-time ingredients of mix-your-own-paint days.

All paint makers print concise directions for the use of their products on the labels of the containers. These instructions should be carefully followed to give the best results.

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CHEMISTRY

Wood Waste Is Source Of Sugary Chemicals

➤ CHEMICAL wealth is extracted from wood waste in a new way by a process on which U. S. patent 2,465,347 has just been granted to Robert M. Boehm of Laurel, Miss., and Horace E. Hall of Lyle, Tenn. Rights have been assigned to the Masonite Corporation, large user of wood chips in the making of wallboard.

When wood chips are subjected to high steam pressure, as in the preparation of wallboard fiber, the liquid that runs out contains in solution considerable quantities of what are known as sugar precursors—substances from which industrially useful sugars can be prepared by chemical treatment. To separate these from the tars, acids and other undesired substances that are also in solution, a mixture of about four parts of acetone and one part isopropyl ether is added. This converts the sugar precursors into insoluble forms, which come down as precipitates in a relatively high state of purity, leaving the undesired substances still in the watery solution which can be poured or filtered off.

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