CHEMISTRY

Crystals Cage Inert Gases

Argon, krypton and xenon, incapable of forming true chemical compounds, have been caged up into stable solid crystalline substances.

➤ A REVOLUTIONARY process in which the inert gases argon, krypton and xenon, called inert because they are incapable of forming true chemical compounds, have been caged up to form stable solid crystalline substances was described and demonstrated to the Royal Institution in London by H. M. Powell, Oxford University chemical crystallographer.

The cage in which the aloof and volatile molecules of the inert gases are trapped is made up of ordinary quinol, a photographic developing material, also known as hydroquinone. The trapping is done by exposing the gas under moderate pressure to a saturated quinol solution and cooling the system to cause the quinol to crystallize out.

The crystals which form under these conditions are stable substances made up of three parts quinol to one of the inert element.

The crystals so formed contain about 70 times their own volume of gas, so that the gas is effectively contained under a pressure of 70 atmospheres, yet the crystals are very stable to ordinary handling. If, however, the crystals are destroyed by dissolving or melting them, then the freed gas escapes quickly.

The explanation for this phenomenon is, according to Mr. Powell, that the crystallizing quinol molecules form a honeycomb of minute cells, or cages, which are just the right size to hold the gas molecules, whose size is of the order of 4 Angstrom units.

Other molecules of similar size—e.g. sulfur dioxide, hydrogen sulfide, hydrochloric acid, hydrobromic acid, hydrocyanic acid, carbon dioxide, formic acid, methyl alcohol, methyl cyanide, and acetylene—can also be trapped to form stable crystalline compounds with quinol.

The name given to these unorthodox crystalline substances is "clathrate compounds," from the Welsh word "clathratus," meaning closed or protected by crossbars of a trellis. The sole determining factor in the formation of clathrate compounds is proper molecular size. Molecules which are too large just won't fit into the cages; those which are too small escape through the lattice-work walls.

Other examples of clathrate compounds are those formed between a nickel cyanide ammonia complex, $Ni(CN).NH_3$, and one molecule of benzene, thiophene, furane, pyrrole, aniline or phenol, all molecules of a similar size.

Since clathrate compound formation is based on molecule size rather than on chemical similarity, it can be used practically in the separation of chemically similar but physically different molecules.

For example, in one simple operation benzene can be separated from other contaminating hydrocarbons and produced in 99.992% purity by forming the clathrate compound with nickel cyanide ammonia and then releasing the caged benzene by dissolving the crystals.

Science News Letter, May 19, 1951

PSYCHIATRY

Normal People Get Mental Symptoms When Given Drug

➤ A DRUG that can make normal people have symptoms like those of severe mental sickness, including hallucinations, suspiciousness and feelings of unreality, was reported to the American Psychiatric Association meeting in Cincinnati.

The symptoms are temporary in the normal persons, almost always disappearing within a day. But they make a normal person feel and act enough like a victim of mental sickness to give doctors a chance to learn more about the nature and causes of mental sickness.

The drug is derived from ergot, the fungus that grows on rye and other grains. Its name is d-Lysergic acid diethylamid tartrate. It was developed at Sandoz Chemical, Inc., in Basel, Switzerland. The experiments with it are reported by Drs. Max Rinkel, Robert W. Hyde and H. Jackson DeShon of the Boston Psychopathic Hospital.

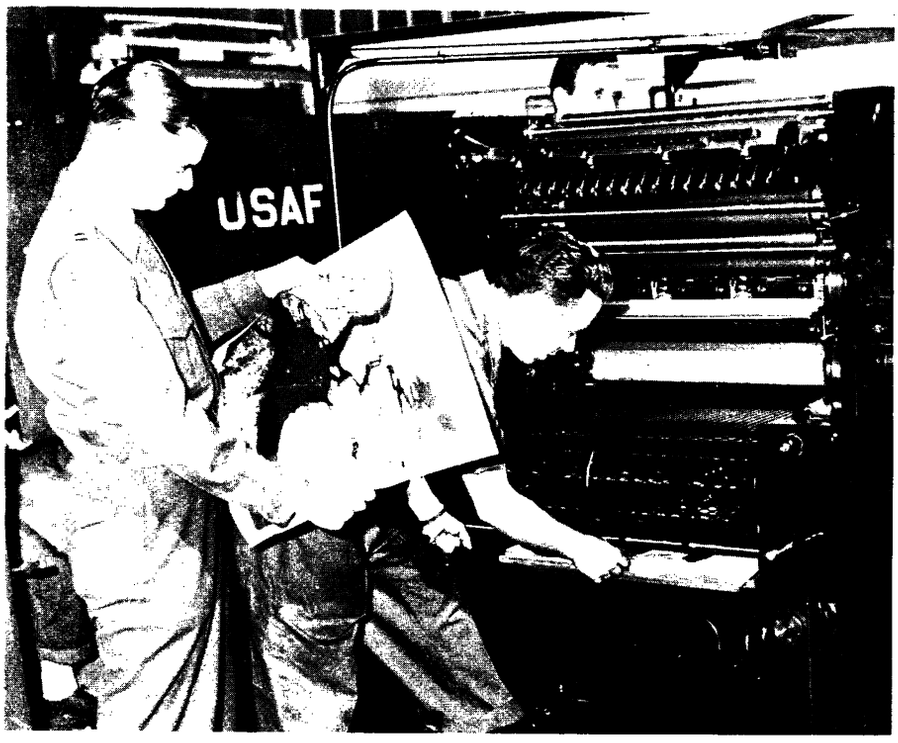
Science News Letter, May 19, 1951

MILITARY SCIENCE

Flying Printing Press Aids Psychological Warfare

➤ NEW AID to psychological warfare is a "flying printing press". It consists of an 8,000-pound package containing an offset printing press with all tools, supplies and necessary equipment. It was developed for the Armed Forces by the Harris-Seybold Company of Cleveland and Dayton, Ohio. It makes possible on-the-spot reproduction of aerial charts, maps and reconnaissance photographs and leaflets for psychological warfare. Because timing is important in use of these, the flying press is expected to furnish the needed speed in preparation.

Science News Letter, May 19, 1951



AIRPLANE PRINTING—Freshly printed aerial photo map is examined by Capt. C. R. Rauscher, project officer for Air Force test runs. Time from removal of tarpaulin to delivery of the first printed sheet was 48 minutes.