MINERALOGY

Man-Made Minerals

Are artificially produced in the laboratory by subjecting ingredients of natural minerals to the pressures and temperatures under which they form in the earth.

➤ SCIENTISTS have borrowed Nature's recipe book to make several minerals in the laboratory under the pressures and temperatures at which these minerals were produced in the earth.

Talc, the stuff that is the base of face powders and has countless other uses, was produced from its ingredients—magnesia, silica and water—in the Geophysical Laboratory of the Carnegie Institution of Washington. Drs. N. L. Bowen and O. F. Tuttle, who performed the experimental work, put a magnesium silicate, serpentine, under high water vapor pressure to produce talc.

Pressures and temperatures required to form the mineral indicated that natural talc is produced in the earth under four to five miles of impervious rock. Other natural minerals made up of magnesia, silica and water which were produced by the Carnegie Institution scientists include the olivine minerals, forsterite and enstatite.

From this research program, disclosed in the annual report of the institution, scientists may be able to learn how natural minerals found in the earth's rocks were originally formed.

To form the minerals, the natural ingredients were put in a new, and as yet nameless, type of pressure apparatus. It is a small, stainless steel cylinder, about half the size of a lipstick container. Talc was produced in the tiny pressure device at a temperature of nearly 1,300 degrees Fahrenheit, under a pressure of 30,000 pounds per square inch. Temperatures up to 1,652 degrees Fahrenheit have been produced in the cylinder.

Other studies with the new apparatus include experiments with potassium, aluminum, silicates and granite and water.

Science News Letter, December 20, 1947

ASTRONOMY

Find Clue to Star's Speed

Strong magnetic fields, observed for the first time in stars other than the sun, may hold the key to the speed of their rotation.

➤ THE key to the speed with which distant stars are whirling may lie in the strength of their magnetic fields. Stars possessing strong magnetic fields are rotating rapidly, the research of Dr. Horace Babcock of Mount Wilson Observatory of the Carnegie Institution of Washington indicates.

For years scientists have been searching for a clue that would show them how fast a far-off star, with its axis pointing toward the earth, is twirling. In the star's magnetic field, Dr. Babcock's work suggests, lies the answer.

For the sun, the magnetic field strength is about 50 gauss and the sun's equator is known to rotate at a speed of approximately 1.25 miles a second. Early-type stars believed to rotate at exceptionally high speeds were investigated. Magnetic fields stronger than 1,000 gauss were found in several and a polar field of some 5,500 gauss was discovered in one. If Dr. Babcock's theory is correct, this star must be rotating at a terrific speed.

For several decades local magnetic fields of 5,500 gauss have been measured in sunspots, showing the fury of their activity. Dr. Babcock's investigation, however, represents the first observation of magnetic fields in stars other than our sun.

The discovery of magnetism in rapidly rotating stars may contribute greatly to our knowledge of the relationship between the magnetic and mechanical properties of large rotating masses, such as stars. It may also aid our understanding of rotating stellar systems such as the galaxy of which the earth is a part.

The controlling effect exerted by the magnetic field of a rotating star on ions and electrons in and beyond its atmosphere may well explain the existence of equatorial rings of tenuous material found around some stars and planets. It may point the way to more complete theories of how planetary systems and double stars are created.

Science News Letter, December 20, 1947

EMBRYOLOGY

Newborn Baby Almost Three-Fourths Water

➤ THE newborn baby is almost three-fourths (74.6%) water. A little more than half (56.5%) of this water is in his blood and in the cells that make up his body. The rest is in the fluid lying between and about the cells and in the body spaces. But as he grows the proportion of water within the cells gets larger.

Salt, tagged with radioactive sodium, and heavy water led to these discoveries in studies by Dr. Louis Flexner and associates at the embryology department of the Carnegie Institution of Washington.

These are the first such studies made on newborn babies, though a number have been made on grown persons.

The radioactive salt, which was too slightly radioactive to cause any damage to the baby, was dissolved in water containing deuterium oxide, or heavy water. This was injected into one of the baby's veins. Two and one-half to three hours later a sample of blood was drawn from a vein. This interval was known to be long enough for the water and salt to be thoroughly distributed throughout the body.

The heavy water goes everywhere in the body along with ordinary water. The salt goes into all the fluid outside the cells but not into the cells. Having a larger space to fill than the salt, more of the water, proportionately, than the salt leaves the blood.

So the blood sample after three hours has lost more of the heavy water than of the tagged salt. The difference tells what proportion of the water has gone into the cells. The degree to which the heavy water in the blood becomes diluted with ordinary water, exchanging with it from the body tissues, tells how much of the body is water.

Dr. Flexner's findings, made on healthy, living infants, agree with those of other scientists made on stillborn babies by other methods.

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