SCIENCE NEWS

Science Service, Washington, D. C.

THE AMOUNT OF OIL TAKEN UP BY SAND

How much oil can an oil sand take up? This problem is of importance not only to the petroleum geologist but to the physicist, chemist and botanist.

The answer is given by Dr. Edward Kasner, professor of mathematics at Columbia University, in a report to the American Mathematical Society. If the grains are perfect spheres, all equal, he says, then for the closest packing 25.955 per cent. of the whole space will be vacant, and can be filled with oil or other liquid; while 74.055 per cent. will be occupied by the sand. This result can be tested experimentally by filling a box with sand and then seeing how much water can be poured in.

The proportions of occupied and unoccupied space will be the same whether the spheres are large or small, provided they are all equal. But if they are unequal, and suitably arranged, then a larger portion of the space can be occupied by the sand, and consequently less oil or water taken up.

This may easily be visualized if we pack a box with oranges. Between the oranges we might insert nuts, between these and the oranges we might get in some peas, and in the spaces still vacant fine shot, and so on until we get down to the finest powders. Thus we would fill up more and more of the space. Mathematically this could go on forever—an infinite series of spheres—of diminishing size. Practically we have to stop with the smallest particle that can be handled. Experiments with mixed sands have in fact succeeded in reducing the vacant space to a few per cent.

It is obvious that spheres, however packed, will have small gaps and therefore space can never be filled 100 per cent. But by a suitable arrangement 99 per cent. can be filled or 99.999 per cent. or as near 100 per cent. as desired. The work is purely mathematical since we are dealing with ideal perfect spheres. In a similar way the plane can be covered with circles (coins or discs of various sizes).

The full mathematics, Dr. Kasner said, will shortly be published in a technical journal.

METALS

How minute cracks, porosity and surface blow holes in metals, invisible to the eye and to x-rays, can be beautifully shown up by use of a fluorescent dye and ultraviolet light was exhibited at the Cleveland meeting of the American Society for Metals by Taber de Forest, research engineer of the Manaflux Corporation of Chicago.

The method is far more sensitive, Mr. de Forest said, than the old kerosene and whitewash method that has been used for this purpose. The liquid which carries the dye penetrates the minutest cracks by capillary attraction, and is washed off from the rest of the surface by plain water. It is true that either of these methods reveals only cracks that reach the surface, but deep-seated defects are often connected with the surface by a network of capillary cracks. Fatigue cracks, it is known, originate on the surface, and shrinkage cracks of castings often appear there. Besides, a small crack is often the starting point of a later failure. These small cracks are not revealed by x-rays because a relatively spacious void is necessary to show up on an x-ray picture.

A simpler and faster method for observing the rate at which one solid metal diffuses into another, an important matter in many practical fields, was described at the same meeting by Howard S. Coleman and Henry L. Yeagley, of the Pennsylvania State College. An extremely thin film of the one metal was condensed on the surface of a microscope slide, and a similar film of the other metal deposited on top of it. Such extremely thin films are semi-transparent. The reflecting power of the contact surface between the two metals was measured and recorded continuously by a photoelectric method, using a powerful automobile headlight as a source of light. As the one metal diffused into the other, the reflecting power of the surface diminished, and was shown by a drooping curve. Under some circumstances a test can be made in as little as five minutes.

NEW STANDARDS ADOPTED FOR TOTAQUINE

DR. E. FULLERTON COOK, chairman of the committee of revision of the U. S. Pharmacopoeia, reports that new standards will soon be officially announced for the anti-malarial, totaquine.

The medicine is a mixture of substances, including quinine, obtained from "Jesuit's Bark." This mixture has the same action against malaria as quinine, but has been little used in this country. Lowering the quinine content to 7 per cent., results in fuller use of South America barks which analyses show average only 1 per cent. quinine. This does not include about a fourth of the bark samples which contained practically no quinine. They contain the other anti-malarial substances, however, which it is believed can be just as effectively used as quinine. The former standard required 10 per cent. quinine or more. Now a ceiling of 12 per cent. will also be included. This presumably was adopted to insure uniform results in treatment and to prevent conflicting therapeutic claims and price differences. Authorities feel that these would be unjustified merely on the basis of one preparation containing more quinine than another.

Another requirement that at least a fourth of the product be cinchonidine and cinchonine will be completely dropped. The lower limit of 70 per cent. total crystallizable alkaloids will have a ceiling of 80 per cent. in the new monograph.

The new standards will be maintained, Dr. Cook explains, for at least the "duration" while the maximum use of anti-malarial supplies is necessary due to exposure of our troops to the fever and the cutting off of our usual imports from the Far East.

The consensus of opinion expressed by experts on tropical diseases at a recent conference called by the National Research Council in Washington is that totaquine is equal to quinine in efficiency in treating malaria.

HOUSING AFTER THE WAR

ABOUT a million new homes per year could be used by Americans during the decade following the war, if they are built in the right places at the right prices, it is estimated in a report issued by the National Resources Planning Board. Besides this there will still be a need for a large volume of repair during the same period.

This potential boom in home building has developed because only three new dwellings have been built for every five additional families that have been formed during the last decade, and because of the drastic curtailment of housebuilding during the war years.

War time housing will take care of only acute needs, according to Miles L. Colean, author of the pamphlet released by the Board. It is also likely, he says, that many war dwellings will not be in the areas where they will be needed after the war. Meanwhile, out-dated and worn-out houses throughout the country continue to deteriorate.

If we had better means for providing attractive, low-priced houses, according to the report, a huge demand would exist for the replacement of these deteriorated and outmoded dwellings amounting perhaps to as much as a fifth of the total stock of about 37,000,000 dwellings, or somewhat over 7,000,000 units ripe for replacement. About 2,000,000 of these are needed on farms alone.

Continued research in materials and techniques is recommended as one of the long range methods of solving this housing problem. This statement recalls plans by some authorities for standard models of houses. They believe this would be a big help, just as standard auto models have made new cars available to most families in the past. These houses would roll off assembly lines in mass production to be assembled in sections with a minimum of expensive "custom tailoring" at the building site. New building materials are also likely. Some foresee the use of plastic-and-plywood walls with a stainless steel roof. Such a house would be strong yet so light that two men could lift the whole wall of a room as they put it up.

Application of scientific research should bring prices down to where the new homes could be constructed all over the country by the hundred thousand. Price has been the main drawback in the past, although it is being steadily reduced. In 1925, dwellings were built for around $4,800 per unit, while in 1940 the average price was down to $3,700.

Other steps outlined in the report as possible aids to accelerating the postwar building program included removal of legal restraints within the house-building industry; preparation of model building codes by the government based on ample engineering service and providing localities with facilities for consultation and testing; and improvement of present government aids for providing adequate housing for Americans.

ITEMS

A CALL has been issued from the Society of American Bacteriologists for motion pictures to aid in wartime teaching. With accelerated courses and shortage of teachers at many colleges, it is believed motion pictures on bacteria, rickettsiae, viruses, fungi and animal parasites would be helpful in stopping the gap. The society has appointed a committee, under the chairmanship of Dr. Harry E. Morton, of the School of Medicine of the University of Pennsylvania, to collect information on the usefulness and availability of such films.

THE acoustic movements of the human ear drum have been seen and photographed for the first time. Moving pictures showing these movements of normal ears and also of ears of patients suffering from deafness were shown by Dr. H. G. Kobrak, of Gary, Ind., and Dr. J. R. Lindsay and Dr. H. B. Perlman, of Chicago, at the Chicago meeting of the American Academy of Ophthalmology and Otolaryngology. Fresh specimens from human cadavers were used. The various parts of the sound conduction apparatus were exposed and the vibrations during the conduction of sound were photographed. On stroboscopic illumination acoustic vibrations of the ear are seen as distinct and slow movements.

A NEW discovery, which may lead to more complete knowledge of our protohistoric North American ancestors and help bridge the 10,000-year gap in archeological knowledge, has been made by Dr. Frank H. H. Roberts, Jr., of the Smithsonian Institution. A bison wallow, two or three thousand years old, which Dr. Roberts excavated in eastern Wyoming, uncovered a number of spear points known as "Yuma points" and formerly thought to date back to the oldest known inhabitant of North America, the Folsom man who lived at the end of the last Ice Age, 10,000 to 20,000 years ago. This new discovery, however, places the Yuma points at a much later date, somewhere between Folsom and modern.

OWNERS of oil burners who are able to secure a wood supply will be able to substitute wood for oil, according to an announcement made by William L. Slate, director of the Connecticut Agricultural Experiment Station. As a result of research in cooperation with Yale University and the University of New Hampshire, the station has developed a wood-burning unit which can be built out of firebrick by any good mechanic and connected with an oil heater of the convertible type. Wood in the fuel magazine is carried by gravity to the combustion zone, where it is distilled with gas. After introducing secondary air, the gas passes into the furnace and burns at high temperature. This emergency unit holds a tenth of a cord of wood, which is sufficient to heat a ten-room house for 12 hours in cold weather without further attention. The only metal part required is the cast-iron door and frame, for which arrangements are now being made. A special bulletin giving the details of construction and operation may be secured from the station or from the Connecticut Forest and Park Association, P. O. Box 1577, New Haven, Conn.