

(8897) A. F. S. asks: Does not liquid oxygen as produced by liquid air become opaque to magnetism, that is, is it slightly attracted by a magnet? A. Oxygen was discovered to be a magnetic substance by Faraday in 1849, by noting that it was attracted to a magnet pole just as iron is, though to a lesser degree. Becquerel was the first to call attention to the subject in recent times. In 1892 Dewar, having produced liquid oxygen in large quantity, renewed the matter and showed that liquid oxygen has about one-thousandth of the magnetic moment of iron. Liquid oxygen is shown in a tube swinging to the pole of a magnet, in Sloane's "Liquid Air," page 337, but the language used in the text describing the experiment is not correct. It should read: "Oxygen was discovered to be magnetic by Faraday." The fact is just the opposite of the statement of the book.

(8898) R. R. J. asks what voltage is required to jump a spark gap of $\frac{1}{4}$ inch, and if the voltage is in direct proportion to the width of spark gap. Also, how to determine the number of oscillations and wave length wireless telegraph system as mentioned in SUPPLEMENT, No. 1383, Siemens & Halske system or any system. A. The voltage necessary to force a spark through $\frac{1}{4}$ inch of air varies greatly with the shape of the terminals, as points, balls or plates; and with the pressure, moisture, and temperature of the air. Thus a spark 1-5 inch long was produced between balls 1-10 inch in diameter by 16,200 volts; and between balls 1 inch in diameter by 18,000 volts pressure. The subject is quite fully treated in Thompson's "Elementary Lessons." The methods of measuring lengths of electrical waves will be found in papers given before the American Institute of Electrical Engineers. Prof. Pupin has presented several papers upon these topics, which we cannot abstract in a letter.

(8899) S. M. G. inquires whether a jump spark coil can be made by single windings instead of primary and secondary windings. If so, what size wire and how heavy insulation is best for a current of 5 to 8 volts pressure? A. A coil can be made for gas lighting and similar small uses with one winding; but a jump spark of sufficient length to make a sure ignition in a gas engine should be an induction coil with primary and secondary windings. A spark coil with one winding may be made with a core 10 inches long, covered with paper. The winding should be of cotton-covered magnet wire, say No. 14, of which 300 feet or thereabout may be wound on. The spark is given at the breaking of the circuit, and is due to self-induction. Each layer may be separated from the adjacent layers by brown paper, not very thick. No very definite rules are required, as there is a great difference to be noted among these coils. The battery may vary, and as it runs down, more cells may be attached.

(8900) A. B. C. asks for a formula for oxidizing linseed oil without litharge; want to have oil very heavy and bright, and entirely free from fat. A. Keep the oil at a temperature of somewhat over 130 deg. C., while a current of air is passed through or over it; then increase the temperature until the oil begins to effervesce from evolution of products of combustion. By continued boiling the oil becomes very thick and may be drawn out into elastic threads, which are very sticky, but do not produce a greasy stain in paper.

(8901) R. F. D. asks: In the Planté type of cell, how many square inches of positive plate surface are reckoned for one ampere-hour? By Planté type I understand that metallic leaden plates are immersed in the electrolyte, which I suppose is correct. A. The Planté type of secondary cell is defined by Foster in his "Electrical Pocket Book" to be "constructed of lead plates so designed as to present a large surface area to the action of the electrolyte, the active material being formed on the plates, either electrically by charging and discharging, commonly called forming, or chemically." The same authority gives a formula for calculating the theoretical capacity of a cell per pound of active material. This is the better way of expressing it, since to base the capacity upon the surface will not take the thickness into account. The practical results given are: For lead peroxide and the same weight of spongy lead per ampere hour: 0.53 ounce for a ten-hour rate of discharge; 0.62 ounce for a five-hour rate of discharge; 0.70 ounce for a three-hour rate of discharge; 1.00 ounce for a one-hour rate of discharge. These numbers are for plates of ordinary thickness and an electrolyte of the density of 1.200.

(8902) P. S. B. wants to know the composition and the method of manufacture, of carborundum. A. The mixture from which carborundum is produced consists primarily of coke and sand, to which is added a small amount of salt to facilitate fusion, and a small amount of sawdust, which evolves gases upon heating, and these gases tend to keep the mass more porous and thus facilitate the escape of the carbon monoxide gases later produced. This mixture is packed between the two carbon poles carrying the current, there being, however, a central core of coke placed directly between the carbon poles, providing thus a conductor for the current and so overcoming the difficulty of starting up, and also keeping the internal resistance more uniform by breaking up the arc into numerous small arcs. Carborundum is a silicide of carbon; the formula is CSi .

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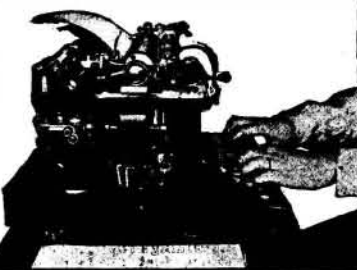


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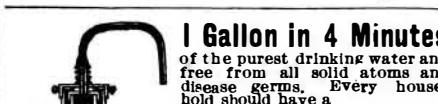
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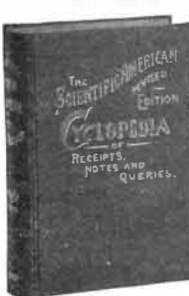
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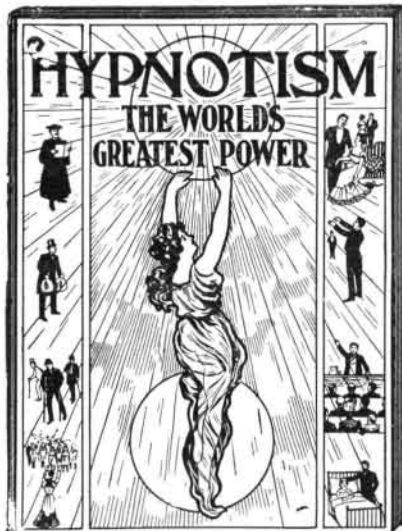
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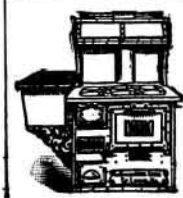
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