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(8592) H. E. S. writes: In the SCIENTIFIC AMERICAN, in Query 8558, H. E. G. wants to know if the three-wire system of distribution is ever used in connection with a single-phase current. If, as I take it, he refers to the secondary mains, or mains from which the service wires leading into buildings are taken, such a system is in use in quite a number of lighting plants. Here our primary voltage is 2,100 volts. Most of our transformers are connected up on the three-wire system, with a voltage of 208 between the two outside wires, or 104 between either outside wire and the center or neutral wire. Most of our customers are supplied with current at 104 volts. Customers having less than ten lights are wired on the two-wire system, larger consumers are wound on the three-wire system, and service wires connected with the mains in accordance. We have one transformer, from which a two-wire 208-volt circuit runs in one direction and a three-wire 208-104-volt circuit runs in another direction. A. It may be that we did not interpret the inquiry of our correspondent H. E. G., No. 8,558, correctly, but we understood him to refer to the mains from the generator to the transformers when he asked if a single-phase current can be operated on a three-wire system. Of course, we were aware that such a current could be connected to the Edison system of house wiring from the secondary of two transformers or from one transformer by tapping the secondary at three equidistant points.

(8593) F. H. P. asks: Is it possible to wind a spark coil of the simple pattern and make a jump spark coil of it? If so, kindly give directions and state the way it should be coupled up. A. A simple spark coil may be made with a core of iron wire (No. 16) 10 inches long and one inch in diameter. Fasten heads for the spool on this, and cover the core with a few turns of brown paper. Wind No. 14 single cotton-covered magnet wire on this to a depth of about 3/4 inch, insulating each layer from the next by a layer of paper. It is better to give each layer a coat of shellac also. The coil is used in series with a battery, and the spark is obtained when the circuit is broken. With six or eight strong cells a thick spark will be given.

(8594) F. H. R. writes: I have a stereopticon lantern, and have been experimenting some with it. For a screen I have a blank wall tinted an orange red. Can you tell me what colored glass I can use with my lens in order to throw a white light upon the red surface? A. To obtain the best effect you must find a glass of a tint the exact complementary of the color of the wall. This will be a bluish green. Of course much light is lost both by the absorption of the wall and of the glass. We should suppose that very little would be left.

(8595) C. F. C. By oversight answer to your inquiry regarding carbon velox was omitted from our answer to your other inquiries. The directions accompanying carbon velox paper are that in ordinary daylight an average negative will require from one to eight seconds; an arc lamp is given as requiring about the same time; a Welsbach burner as requiring several more seconds; and a five-foot gas burner at three or four inches as requiring from one to two minutes of exposure. Velox paper is opened and handled by gas light; from which it is seen that it is less sensitive than ordinary lantern slide plates, though there are brands of these which are manipulated in yellow light.

(8596) F. I. G. asks: I have read the statement in a medical journal that Prof. Fittka, of Marburg, claims that arsenic is  $Pn_2C$  and that antimony is  $Pn_2O_2$ . Can you tell me if he or any one has demonstrated the above? A. In the latest published list of elements, under the authority of the American Chemical Society, the names of arsenic and antimony are both given. We do not think chemists have concluded that any one has proved that the substances named have been decomposed into any simpler forms. It is of course possible that the so-called elements are not all or any of them elements, and investigators at some time may be rewarded by the discovery of the method of separating the ele-

*(Continued on page 321)*

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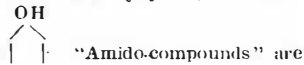
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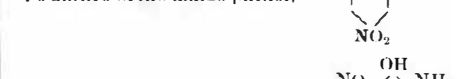
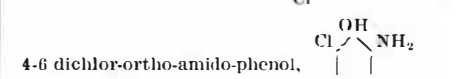
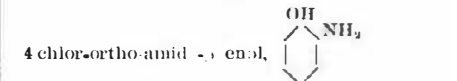
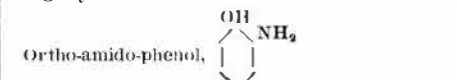
ments into simpler forms. It has not, however, yet been done to the acceptance of competent chemists.

(8597) G. M. C. asks: 1. What is the difference between the current generated by a magneto machine and that generated by a dry battery? 1 notice that the former cannot be used like the latter for lighting a miniature lamp and for some other purposes. A. The magneto of a telephone set generates an alternating current of too small amperage to light a lamp. 2. Will a standard Fuller battery become exhausted by standing with its poles disconnected? If so, why? A. All bichromate cells should have the zincs lifted out of the liquid when not in use, because the acid acts upon and dissolves the zinc all the time it is in contact with it. 3. When the poles of a battery are connected through a circuit of practically no resistance, so that the battery does no work, what becomes of its energy? A. You are in error in saying that the battery does no work when on short circuit. It is sending a maximum of current and produces a maximum of heat. 4. Can an incandescent lamp be destroyed by sending too strong a current through it? A. Certainly. 5. What are gas mantles composed of? A. Gas mantles are composed of oxides of the rare earths upon a mesh of thread, which burns when the mantle is lighted by a match, leaving the oxide to glow with the heat of the flame.

(8598) H. M. W. asks: Will you kindly inform me what the following consist of, viz.: Ortho-amido-phenol, 4 chlor-ortho-amido-phenol, 4,6 dichlor-ortho-amido-phenol, 4 nitro-ortho-amido-phenol, 4,6 dinitro-ortho-amido-phenol, 4 chlor-6 nitro-ortho-amido-phenol? A. The composition of the organic compounds is difficult of representation except by the method of the chemists, or by means of a diagram. Benzole, or benzene, is the basis of the "aromatic" or "ring" compounds. Its formula is  $C_6H_6$ ; or expressed graphically, it is a lozenge-shaped figure, as shown here, with six points for bonds. Since this is a very troublesome formula to write out continually, it has come to be conventionally symbolized by a hexagon, the six angles of which are numbered from the top around with the hands of a clock from 1 to 6. When nothing is attached to any of the numbered points, it is understood that one atom of hydrogen occupies the position. "Ortho-compounds" are those in which the attached radicals occupy adjacent points, such as 1-2, 3-4, 5-6. "Meta-compounds" are those in which the attached radicals occupy alternate points, as 1-3, 2-4, 3-5. "Para-compounds" are those in which the radicals occupy opposite points, such as 1-4, 2-5, 3-6. "Phenol," or carboic acid,  $C_6H_5-OH$ , is denoted



those containing the radical  $NH_2$ . Hence amido-phenol is represented by the diagram Hence also there may be three amido-phenols--ortho-amido-phenol, meta-amido-phenol, and para-amido-phenol. The compounds named above are all of the "ortho" series. The numbers used in the names refer to the number of the points of the lozenge as above stated. It is now possible to indicate the composition of the compounds intelligibly--



The formulas in the ordinary mode of writing are as follows:

- Ortho-amido-phenol,  $C_6H_4NH_2-OH$ .
- 4 chlor-ortho-amido-phenol,  $C_6H_3ClNH_2-OH$ .
- 4,6 dichlor-ortho-amido-phenol,  $C_6H_2Cl_2NH_2-OH$ .
- 4 nitro-ortho-amido-phenol,  $C_6H_3NO_2NH_2-OH$ .
- 4,6 dinitro-ortho-amido-phenol,  $C_6H_2(NO_2)_2NH_2-OH$ .
- 4 chlor-6 nitro-ortho-amido-phenol,  $C_6H_2ClNO_2NH_2-OH$ .

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