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Notes and Queries.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication. References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and though we endeavor to reply to all either by letter or in this department, each must take his turn.

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(8448) O. L. P. asks: 1. How to construct a jump-spark coil. A. A spark coil for gas engines is described in the SCIENTIFIC AMERICAN, Vol. 72, No. 2, price ten cents. 2. Can a jump spark be timed so as to regulate the point of ignition in gas or gasoline engines? A. Yes. 3. How many cells of dry battery are required to properly operate coil? A. Six or more are ordinarily used.

(8449) J. J. S. asks: 1. In making Leyden jars, I have had great difficulty in coating the inside with tinfoil. Will you kindly advise me on the following points: Would it do equally well to half fill the jar with tinsel, of course coating the outside with tinfoil? A. No. The tinsel will not be continuous, nor will it be in contact with the sides of the jar. 2. Would it do to shellac the inside up to the proper height and shake in bronze powder? A. Not so well as tinfoil. 3. In using tinfoil, should the bottom, inside and outside be covered? A. Yes. There is not much difficulty in placing the tinfoil properly in the jar. Cut the foil into strips of two inches or thereabout in width. Apply the paste to the inside of the jar with a long-handled brush. Put the foil in with forceps or in any other convenient manner, and bring it to its place and rub it down with a dry brush with long bristles. 4. I have made a Wimshurst machine with 18-inch plates, but can only get a spark of 3/4 inch. Is this all a machine of that size is capable of, or have I made some mistake in construction? A. The spark is not long when a Leyden jar is not used. And indeed when the jar is used, its effect is to render the discharge intense rather than to lengthen the spark.

(8450) F. S. writes: 1. A friend of mine got into an argument with me concerning electricity. I said it was made or generated by the use of a magnetic field or produced by the chemical changes which take place in a liquid cell. He said it was gathered or collected from the air in all cases, either by mechanical means or chemical means. He said he would not believe that I was right, and so I said I would see who was right: and please describe how it is made, so we may settle the question. A. Electricity is produced in batteries by chemical action; in most primary cells by dissolving zinc in sulphuric acid. It is produced in dynamos by revolving coils of wire in a magnetic field; in thermo-couples by heating the junction of two metals. The first two methods named are the ones by which most of the commercial current is generated. There is electricity always present in the atmosphere, which can be detected by the proper instruments, but which is seen by any one in thunderstorms. This electricity is, however, not used for any practical purpose. 2. I have a magneto-generator, such as are used in telephones, giving an alternating current because there are only two sets of coils on the armature. Why is it not possible to use a ring armature and have one continuous coil wound on it, having a one-piece commutator? Would it generate a continuous current by keeping the current up to a maximum instead of at zero and then a maximum, and about what would be the voltage? Could I increase the strength of the permanent magnetic field by wrapping it with magnet wire in the right direction, and if possible could you tell me the amperage of a telephone magneto-generator wound the way I have described? A. The current of the magneto is alternating because the armature is not provided with a commutator. A direct current can be produced by a single coil on an armature if there is a commutator. We do not know how much you can get out of your magneto: enough to ring a bell, surely, but not enough to do much more than this.

(8451) C. M. C. writes: May I trouble you with a request for information on the following phenomenon, to me curious, and as to which so far I have been unable to find any explanation? An ordinary incandescent electric-light bulb after the current is cut off exhibits for some hours a peculiar phosphorescent glow, emitted apparently from the inner surface of the glass and quite strong enough to enable a coarse print to be read if placed close to the bulb. This glow or phosphorescence becomes dimmer and stronger in part.

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sations of about three seconds. It becomes stronger when the hand is brought close to the glass, say within half an inch, and concentrates at the point of the bulb nearest the hand. Perhaps I should say it becomes brighter at such point, as there is no diminution of the light in other parts of the glass. The light is pale and green. It more nearly corresponds to a phosphorescent appearance than any other kind of luminosity. It does not seem to be traceable to leakage of electricity. The filament or carbon of the bulb exhibits no light whatever. A. This phenomenon can be produced in most lamps by holding them near the pole of the secondary of an induction coil. We suspect that this is the same thing and that the circuit is an alternating one, so that the alternations of the E.M.F. produce the fluorescence in the bulb, which lasts long enough after the current is turned off to be visible in the dark. It may be that the lamp, too, is exhausted just to the degree that makes this possible. Another lamp in the same place may not show the same effect.

(8452) W. C. writes: Referring to No. 8399, answer to B. R., page 253, current volume, under heading Notes and Queries, it is stated that the way to form a normal solution of sulphuric acid is to add 98 mg. to 1 c.c. H₂O; I have the honor to invite your attention to the following: A normal solution is formed by dissolving in 1,000 c.c. of H₂O (distilled) at 15.5 deg. C., the weight in grammes of the hydrogen equivalent of the active reagent.

SO₄ is the active reagent in H₂SO₄, SO₄ is bivalent, i. e., 96 grammes SO₄ = 2 grammes H. ∴ 48 grammes SO₄ = 1 gramme H. 98 grammes H₂SO₄ contain 96 grammes SO₄ (active reagent). ∴ 49 grammes H₂SO₄ contain 48 grammes SO₄ (or hydrogen equivalent). ∴ Dissolve 49 grammes H₂SO₄ in 1,000 c.c. H₂O.

A. The solution based on the hydrogen equivalent is in the United States called the "Equivalent Solution," and is in use very largely by pharmacists. It is usually taught in their schools. It is the chemical standard in England (see Sutton's Volumetric Analysis), but has not prevailed in this country. Cairns' "Quantitative Analysis," which is as much as any the American authority, page 305, gives the definition based upon the molecular weight of the substance, as we gave it in our note. Since receiving your letter we have referred the matter to a professor of analytical chemistry in one of our colleges, who is continually making such solutions, and to a prominent expert chemist in this city. Both of these are practical chemists and know even better than we what chemists employ as normal solutions. They agree that our former answer is the American practice. A normal solution is made up so that 1,000 cubic centimeters of the solution contains as many grammes of the reagent as its molecular weight. The molecular weight of sulphuric acid is 98. Therefore 98 grammes weight of sulphuric acid are to be added to distilled water, and the volume brought up to 1,000 cubic centimeters by the addition of distilled water. You inadvertently and doubtless unintentionally say "49 grammes in 1,000 cubic centimeters of water." This slip is frequently made. The total volume of the solution is 1,000 c.c.; 49 grammes of sulphuric acid measure between 27 c.c. and 28 c.c.

(8453) P. S. writes: 1. Can commercial calcium sulphide be used for phosphorescent paint or light? A. No. 2. If it cannot, what are its uses? A. It has some use in medicine. It may be used for the preparation of sulphureted hydrogen. 3. What is the chemical action of a secondary battery made of copper, zinc and lye? A. For a discussion of this subject, see Treadwell's "Storage Battery," price \$1.75 by mail. In general, zinc is taken from the solution while charging and deposited upon the zinc plate; oxygen is evolved, which attacks the copper and forms copper oxide upon the positive plate. In the discharge the opposite changes take place. 4. If two pieces of annunciator wire about ten or more feet in length are laid parallel with the insulations touching and with the terminals at one end not connected and those at the other end connected through a telephone receiver and secondary of a medical coil in series, or one terminal to the platinum-pointed screw of a buzzer through the receiver and the other terminal at the same end connected to the vibrating contact, is the sound produced in the receiver caused by leakage, induction between the wires or do the wires act as a condenser? (This also takes place to an extent when the ground is used instead of either wire.) A. We scarcely understand your arrangement from the description; but, if there is a sound produced upon an open circuit, it is by means of waves transmitted across the space separating the wires, as is frequently the case by induction in the working of the telephone. 5. Are the use of the magneto, the galvanometer and similar instruments the only ways for testing for leaks? A. For methods of testing wires and cables, see the book on that subject by Webb, price \$1; or Kempe's "Electrical Testing," price \$7.25. Latest editions. 6. What is the average or extremes of resistance in woods? A. Dry wood is an insulator, and wet wood may have any resistance according to its wetness.

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