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## Notes &amp; 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 This is for our information and not for publication.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.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

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Minerals sent for examination should be distinctly marked or labeled.

(5070) S. E. B. writes: To settle a controversy between myself and Dr. A., please state whether or not the surface of Lake Michigan has fallen, or is eight to ten feet lower now than ten years ago. The doctor goes to Petoski, Michigan, every August, and he claims that the surface of the water in Little Traverse Bay is now eight or ten feet lower than when he first visited the place, ten years ago. I claim that he is wrong, or we would have seen some mention of the fact in some of the newspapers. A. According to one of our best authorities, Professor G. K. Gilbert, of the United States Geological Survey, who has made a special study of the great lakes, there is no steady or continuous lowering of the waters of Lake Michigan. Two years ago the lake was two feet below the average, while a few years earlier it was a few feet higher than the average, which would make an apparently continuous drop of four feet. The lake is entirely dependent on rainfall for its general level, rising during a rainy season, and falling during a protracted drought, and differs only from smaller bodies of water in this respect, that the supply from drainage or watershed of the surrounding shores is less appreciable. In the long run the average level remains essentially the same. According as the conditions just indicated vary, the Chicago river, for instance, flows to or from the lake, but were here any permanent lowering it could not be made to flow backward into the Mississippi. The writer lived in Chicago thirty years ago, and both river and lake are at the same average height they were then. Long-continued winds to or from the shore materially affect the height of the lake locally, but such influences are quite ephemeral.

(5071) C. W. M. says: Can you direct me where to find instructions for making sheet wax for dentist's use? A. Dr. H. E. Beach, Clarksville, Tenn.,

says: Take of pure clean wax anywhere from 1 to 5 pounds, put in a tin bucket or any deep vessel, with clear water sufficient to fill it within  $\frac{3}{4}$  inches of the top. Set on the stove till thoroughly melted, then set aside until partially cooled; skim all the air bubbles off. Then fill a smooth, straight bottle with ice water, a bucket of which you should have by you. Soap the bottle and dip it deliberately in the solution two or more times, according to the thickness you desire your wax. After the last dip, as soon as the wax hardens to whiteness, cut a line through it and remove it from the bottle as quickly as possible. Spread to cool and straighten out smooth while warm. Continue this process until all the wax is made into sheets. Paraffine, or paraffine and wax, may be made in the same way and colored and perfumed to suit one's fancy. The water in the bottle should always be kept cold, in order to get the best results.

(5072) R. W. H. asks how to make a good lye. A. Hickory ashes are the best for making common washing soft soap (when it is not desirable to use the potash lye), but those from sound beech, maple, or almost any kind of hard wood except oak will answer well. A common barrel set upon an inclined platform makes a very good leach, but one made of boards set in a trough in V shape is to be preferred, for the strength of the ashes is better obtained, and it may be taken to pieces when not in use, and laid up. First, in the bottom of the leach put a few sticks, over them spread a piece of carpet or woolen cloth, which is much better than straw, put on a few inches of ashes and from 4 to 8 qt. lime, fill with ashes moistened, and tamped down well; tamp the firmest in the center. It is difficult to obtain the full strength of ashes in a barrel without removing them after a day's leaching, and mixing them up and replacing. The top should be first thrown off and new ashes added to make up the proper quantity. Use boiling water for the second leaching. This lye should be sufficiently strong to float a potato.

(5073) F. H. says: 1. Please give me the voltage, amperage, resistance, and durability of the Fuller battery, and also a description of the battery. A. The electromotive force of the Fuller battery is about 2 volts, its resistance is about 2 ohms; therefore the current will be equivalent to approximately 1 ampere on a circuit of no resistance. 2. I have four zinc carbon piles; with them I want to light an 8 volt 0.8 ampere Swan incandescent lamp. Which would be the best and cheapest filling, and how long would it last? And how would I be able to prevent chemical action on an open circuit, because I want to use the lamp every evening? A. Probably a chromic acid solution would be best, but we know of no way to prevent action when the circuit is open, and furthermore, it would soon become exhausted when used in electric lighting.

(5074) F. L. asks: 1. How many Leclanche or sal ammoniac cells will it take to ring a common bell over a 700 foot line of No. 18 annunciator wire? Would a return wire be more satisfactory than grounding? A telephone is to be used on the same line. A. Four cells will operate the line if the resistance of the bell is not too great. 2. Is it the high resistance of our bodies that causes us to receive a shock from a strong current of electricity passing through them? A. It is the effect of the current upon the nerve centers. 3. If the two arms of a U-shaped piece of steel are placed against the positive pole of a dynamo, will the two arms be of the same polarity? Will the curve or bend be the positive and the two arms negative? I have one so magnetized, and the filings arrange themselves around the middle of each arm of the magnet. A. The poles which touch the positive pole of the dynamo are negative. The fact that the filings gathered about the middle of each arm of the magnet shows that consequent positive poles were developed. 4. Does it weaken or take magnetism from a permanent magnet to magnetize other steel objects with it? A. No.

(5075) W. S. P. writes: 1. In regard to a Fuller bichromate battery. I would like to make one to hold 3 pints of Grenet battery fluid, and put the zinc in the porous cup. Can you tell what I could put in the porous cup instead of mercury? Can I use a rod of zinc? Can I make a porous cup out of plaster of Paris or out of white clay? A. There is no substitute for mercury in the Fuller battery, and although you can use a rod of zinc if you desire to do so, the cone used in the regular Fuller battery is preferable. A plaster of Paris cup is of no value in a battery of this kind; you can, however, make the cells out of white clay baked; but as porous cells cost very little, we think you would derive more satisfaction from the regular manufactured one.

(5076) H. M. W. says: We are having a good deal of trouble in our trimming department with moths. Can you give us any remedy whereby we can fumigate our rooms and kill the moth flies and moth worms? Reply by Professor Riley: The insect complained of is probably either the buffalo moth or more properly the carpet beetle (*Anthrenus scrophulariae*), or the common case-bearing clothes moth (*Tinea pollionella*). The first of these insects I have treated in *Insect Life*, Volume II., pp. 127-130, and the latter is illustrated on page 212 of the same volume, in the article upon clothes moths, which covers pages 211 to 215, to which for details I would refer. Briefly, I may summarize the life histories of the two species as follows: The larva of the carpet beetle is brown in color and is clothed with stiff brown hairs, which are longer around the sides than on the back, and still longer on the extremities. It is elliptical in form and active and it is in this stage that the greatest damage is done. The perfect beetle is 3-16 of an inch long, broadly elliptical in shape, and black, white, and scarlet in color. The beetles begin to appear in the fall and continue to issue throughout the winter and spring. Under ordinary circumstances there is probably but one annual generation, although with plenty of food and a high temperature there may be more. The case-bearing clothes moth is light brown in color and begins to make its appearance in May, and may occasionally be seen flying as late as August. The female lays her eggs in dark corners and in the deep folds of garments, the white soft-bodied larva making cases for themselves in the fragments of cloth upon which they feed. The case is in the shape of a hollow roll or cylinder and the interior is lined with silk. When full grown they transform to pupae within their cases, sometimes leaving the cloth and crawling to some distance to transform. Of this insect

also there is but one annual generation. A thorough spraying with benzine will kill either of these insects in all of their stages, but as the company wishes to do something in the way of fumigating, they can do no better than to close the infested rooms tightly over Sunday, arranging the trimmings so that they are not in compact masses. Then place here and there, on shelves and step-ladders, open vessels containing bisulphide of carbon, the rapid evaporation of which will fill the room with its deathly vapor and destroy all, or nearly all, of the insects. The amount to be used depends upon the cubic contents of the room to be treated. It is safe to say that one pound to each one thousand cubic feet will be sufficient, but the proportions may be increased somewhat without danger. Thus, one pound will suffice for a room 10x10x10, but eight pounds would be required for a room 20x20x20. As before stated, the room should be closed as tightly as possible and left for 24 hours. It should then be thoroughly aired and every precaution should be taken to avoid the introduction of fire or light into the room until the vapor has thoroughly dissipated, as it is very inflammable and explosive when at all compressed. A thorough trial of this remedy will probably prove satisfactory.

(5077) A. W. writes: As you are frequently publishing simple modes of illustrating physical principles, I send you something which I trust you will find new. Cut a strip of opaque paper, and hold it horizontally before the flame of a lamp turned edgewise. On looking at the paper with one eye closed, it will appear to be notched where it cuts the flame. This is caused by the persistence of the bright image of the flame on the retina, and is one more instance that the eye cannot see two things that are separate at one and the same instant. A. The effect to which you refer is not due to persistence of vision, but to irradiation. The appearance of the notch is caused by the sympathetic action of the retinal nerves adjoining those directly acted upon by the light.

(5078) J. T., Jr., writes: 1. I have a Bunnell battery, such as is used for telegraphing. Will it run a small Gramme ring motor described in *SCIENTIFIC AMERICAN*, January 17, 1891? A. Yes. 2. How many cells of this battery will run a sewing machine motor? A. A gravity or sulphate of copper battery is not suitable for running electric motors designed for doing any great amount of work. 3. Is there an electric motor for running sewing machines on the market, and are they any good? A. Such motors are on the market and they are used more or less. You will find them referred to in our advertising columns. 4. What book on electricity for amateurs would you recommend? A. We would recommend "Experimental Science," price by mail \$4; and Ayrton's "Practical Electricity," price \$2.50.

(5079) W. H. B. asks: 1. In making zincs for medical batteries is anything but pure zinc used? A. No. 2. Should the zincs for medical batteries be amalgamated with mercury? A. Yes. 3. Give most approved formula for making medical battery fluid. A. It depends upon the kind of battery. If it is an ordinary Grenet battery, use a bichromate solution made by dissolving bichromate of soda in water to saturation, then add one-fifth its volume of common sulphuric acid. If it is a chloride of silver battery, the solution may be one chloride of ammonium, or of common salt.

(5080) H. R. E. asks: By what name is caustic magnesia known to the trade, and is it dangerous to handle? A. Calcined magnesia is the form in which the oxide occurs in commerce. This is the anhydrous oxide MgO. The hydrate or caustic magnesia Mg(OH)<sub>2</sub> occurs as the mineral brucite. There is no danger in handling them.

(5081) W. H. asks how to make nitrite of soda from nitrate of soda. A. Fuse with lead or copper filings, dissolve in water, filter, and evaporate to dryness.

(5082) J. P. L. writes: I have read that large masses of cast iron could be broken by drilling a hole in the most solid part of the casting, and filling it with water and fitting a steel plug in the hole, and by striking it with a drop the casting would break. Why is it that cast iron can be broken in this way? A. An enormous hydraulic pressure can be thus produced, which breaks the metal.

(5083) L. H. H. asks for a recipe for obtaining a good black color on cast brass name plates, such as are put on various machines by the makers. A. The letters are filled in with the following composition: Melt together in a clean iron pot 2 parts each of best asphaltum and gutta percha, stir well together, and then add 1 part of gum shellac in fine powder. It may be used hot and mixed with smalt, vermilion or other pigment, if desired.

(5084) C. De W. S. asks: 1. Can a person run electric lights with the same batteries that are used for telegraph? A. The resistance of telegraph batteries is too great to permit of their use for electric lighting purposes. 2. What is a good receipt to paint blackboards with, so that they will not act greasy and the chalk will rub off clear and clean? A. Five pints of 95 per cent alcohol, 8 ounces of gum shellac, 12 drachms of lamp black, 20 drachms ultramarine blue, 4 ounces powdered rottenstone and 6 ounces of pumice stone.

(5085) W. M. C. asks: What does the term tons mean when used to indicate the size of a ship? I had the idea that it meant the weight of the ship, but have recently heard that it denoted the carrying capacity. Which is correct? If the latter, what does the word displacement mean, used in the same connection? As for instance, the size of the United States ship Philadelphia is given as 4,324 tons displacement. A. Displacement is the weight of a vessel and is named in tons of water that it displaces. Tonnage is the carrying capacity of a vessel.

(5086) W. F. Z. asks: Will you please inform us which is the best and cheapest paving for a mud street in a town of 5,000 to 10,000 inhabitants? A. The cheapest in first cost is wood. Cheapest, considering durability, is brick. It might be well for you to examine the various exhibits at the World's Fair, relating to pavements and roadways.

(5087) J. F. S. asks: 1. Are Leclanche batteries capable of lighting the small Edison incandescent lamps, say from five to ten minutes at a time,

three or four times per night? A. Yes. 2. How many cells will be required to run two lamps of 4 and 6 candle power, connected in series? A. The lamps of this size are rather large for use in connection with Leclanche batteries. It would require about 10 cells for a 6 candle power lamp and 8 for the 4 candle power. 3. What is the greatest distance the common form of Bell telephone with Blake transmitter has worked successfully? A. Under favorable circumstances, 100 miles or more. 4. What is the multiphase motor? A. The multiphase motor is one in which the current is distributed in the field magnet in such a way as to cause the field to rotate, the poles of the armature following the poles of the rotating field.

(5088) B. E. W. asks: Please say how the tin or iron enameled ware, commonly known as granite ware, is made, and if it could be made on a small scale by a person not skilled in the work. Also, does the blue and white enameled ware made in Germany differ from it except in color? A. Gray enameled ware is done in same manner as the white cast iron ware. It only requires more care in handling and firing the sheet iron goods. The gray color is made by a uniform coat sprinkled with the darker enamel from a brush. In the finest ware two to three firings are required to make the finish. The process and composition of the enamels is described in "Techno-Chemical Receipt Book," \$2 mailed. The German enameling is of the same kind as made here, only different color. We do not advise amateurs to try this style of enameling. It requires some skill, a properly built oven and technical knowledge in compounding the enamels.

(5089) B. M. W. asks: Can you give me any information regarding a paint that could be used on iron pipes and vessels that are heated from the inside by steam, the temperature on said vessels not to go over 300° Fah.? All the paints I have tried so far burn off in from 2 to 4 hours. Also a receipt for mending pin holes in rubber air pillows. A. Steam pipes for high pressure steam are usually painted with coal tar or liquid asphalt. Red oxide of iron paint (dry) mixed with boiled linseed oil only is much used on steam pipes. Use rubber cement for mending pin holes in rubber pillows; push the cement through the hole with a small stick while the pillow is partly filled with air and allow it to thoroughly dry before using.

(5090) C. L. asks: 1. About what degree of heat is produced in the oven of any one of the cooking stoves or ranges used by the people of to-day? A. Baking ovens have a range of temperature for cooking from 250° to 350° Fah. 2. Please give three or four metals which possess the greatest expansive properties, yet will not fuse in this heat. A. One of the metals that has the greatest range of expansion by heat is zinc, which melts at 680° Fah. It will expand 0.005 of an inch in 10 inches length for 268° change.

(5091) A. B. asks: Will you please tell us what composite and scrophulariaceae plants are? They are spoken of in a bulletin of the United States Department of Agriculture, Division of Entomology, in connection with buffalo beetles. A. Composite plants include the very large number of plants belonging to the natural order Compositae. Among them as more particularly attractive to the buffalo or carpet beetle (*Anthrenus scrophulariae*) are the daisies, chrysanthemums, asters, and solidagos or goldenrods. Scrophulariaceae plants, in the same way, include those belonging to the natural order of that name, and among those most attractive to the carpet beetle are the true figworts (*S. raphanaria*) whence the specific name of the insect, the mullein (*Verbascum*) and the foxglove (*Digitalis*).—C. V. R.

(5092) K. S. G. asks if there is an electric motor made that will run a 20 foot boat from 3 to 5 miles per hour, using a plunge or any cell battery that will be practical? A. Any of the well known makers of motors could furnish you with a motor that would run the boat easily at the speed stated. A storage battery would be required for the best results. For addresses of makers of electric motors we refer you to our advertising columns.

(5093) J. L. K. asks for the best way to mould sheet zinc into rods the size of carbon pencils. A. You can melt and cast your zinc into rods, using sand moulds. 2. Could I run the simple motor described in "Experimental Science" with the plunge battery made with tumblers each holding one pint, using 1 zinc rod and 2 carbon rods to each cell? If so, how many cells would be necessary? A. The battery you describe will be too small for running the motor referred to. You will be obliged to make a large battery like that described in "Experimental Science."

(5094) J. Q. D. writes: I can find no reliable data as to the proper sp. gr. to make brine for refrigerating purposes. As the operation is one of the abstraction of heat, would a brine just sufficiently strong to prevent freezing at the temperature of the brine tank give better results than one weighted with salt above the amount necessary to prevent freezing, and if so, to what extent? I believe the rule of thumb governs most establishments in making brine, and that therefore little or no attention has been paid to this important point. A. Brine absorbs heat according to its density, and faster than fresh water. For best effect for the least pipe surface the density should be near the saturation point, yet not near enough to produce crystallization in any part of the apparatus, as the intense cold in the ammonia expansion surface would crystallize the brine that would not show saturation by several degrees in the solution tank. We understand this point is well known among experts.

(5095) B. R. writes: 1. The beam, pans, etc., of my chemical balance have been badly corroded by fumes of nitric acid, a bottle of which was placed in the balance by mistake, and left there for some time. How can I restore the original finish to the corroded parts? A. You can only restore the balance by refinishing with flour emery cloth and relacquering. 2. What is the best form of voltaic cell for ordinary electroplating? A. Electroplating, the Smee battery.

(5096) H. S. R. writes: I wish to build a small cannon of gun metal with an inch bore. It will be more of an ornament than anything else, but of course will use it occasionally. It will not be a breech loader. Can you kindly give me information as to its proportion,