[The Editor of the Home Laboratory will be glad to receive any suggestions for this department and will pay for them, promptly, if available.]

WANDERING CHEMICALS.

BY PROF. GUSTAVE MICHAUD, COSTA RICA STATE COLLEGE.

To cause two objects to change place, that is, to pass from one vessel into another and *vice versa*, is a trick sometimes done by conjurers. What is new

CONTENTS OF TUBES BEFORE SHAKING.

in the performance described here is the evident non-intervention of the magician, and the possibility of watching the trick closely in full light. The vessels used are two perfectly transparent glass test tubes. Every spectator can see that they contain nothing but the two substances about to change place. One of these is a fluid, transparent, colorless liquid, which fills about one-half of the tube. The other tube contains nothing but a white, opaque powder. Both tubes are given to some skeptical spectators, with the request that they be kept well apart, one tube in each hand, and that the experimenter should remember which of the liquid or solid is kept in the right or left hand. The skeptical person is then ordered to close both tubes with his thumbs, and to shake them. After having complied with this request, he will find that the two substances have apparently changed places; the tube which contained a white, opaque solid now contains a colorless, transparent liquid; and the tube which contained a watery liquid is now filled with a white, opaque, perfectly solid substance.

Some curious and but little known properties of two organic substances are used for this performance. One of them is the property of salol to remain in the surfusion state with such a tenacity (in open vessels, in presence of unfiltered air) and for such a time that no other substance equals it in that respect, except perhaps the metal gallium. Salol is used in medicine for some kinds of intestinal troubles, and is sold at every druggist's. Some ten grammes of it are placed into a clean and dry test tube, care being taken not to leave crystals adhering on the walls of the tube.

CONTENTS OF TUBES AFTER SHAKING.

The chemical is then melted over any flame. (A candle will do, as the fusion point of salol is but 43 deg. Centigrade.) Once liquid, it is heated a trifle over its fusion point, so as to melt any particles of salol left over the liquid. This is then allowed to cool and is ready for the experiment, even two or three hours after being cold. Carrying it to and fro will not cause

the crystallization, but vigorous shaking for about ten seconds invariably transforms the liquid into a solid white mass. At the moment of the solidification the cold tube instantaneously becomes hot.

The property of solid camphor to rapidly melt into a liquid compound whenever ground or shaken with solid chloral hydrate is used in the other test tube. The two chemicals must be finely powdered, and the camphor is sprinkled with a few drops of alcohol before being ground. The two white powders look alike and are superposed in the tube, two parts, in volume, of camphor being taken for one of chloral hydrate. The shaking rapidly mixes and liquefies them.

Large tubes or bottles of any thickness can be used when the experiment is made in a hall. The fusion of salol is then produced in a water bath.

GEISSLER TUBES FROM ELECTRIC LIGHT BULBS.

BY JAMES BAILEY.

Many people have wished to perform experiments with Geissler tubes, but owing to their high cost, have not been able to do so.

By the following simple and inexpensive method anyone who possesses a one-inch, or larger, induction coil can make a very good substitute for a Geissler tube from any of the standard electric light bulbs. Burned-out lamps or lamps in which the filaments are broken give the best results, and can be had for next to nothing. The effect is much better if the filament is broken into fine pieces, as it then does not interfere with the discharge in the bulb. Metal filaments can easily be broken by striking the lamp with the hand, but in carbon lamps the filament is sometimes so tough that it cannot be broken without injuring the bulb.

First make a cone-shaped lump of sealing-wax with a wire or a pin through the center, as shown in Fig. 1. Then heat the bulb enough to make the wax stick to it, and press the cone against the bulb, holding it there until the wax has set. The end of the wire will now press against the glass, as shown in Fig. II. Great care should be taken to get the wire and glass stuck in the wax perfectly air-tight, as the permanence of

GEISSLER TUBE MADE OUT OF AN ELECTRIC LIGHT BULB.

the completed tube depends entirely upon this. When the wax is cool, connect the wire to one terminal of the coil and the socket end to the other terminal. The current will puncture the glass directly in front of the wire and a light bluish glow will fill the bulb. If the wax was stuck to the glass and wire perfectly air-tight no air can leak in through the fine hole made by the spark, and the vacuum will not be destroyed. If air does leak in, the whitish blue color will gradually change to a pinkish glow, and when just the right amount has leaked in, striations will occur as in real Geissler tubes.

Allowing just the right amount of air to leak in is a rather difficult process, but it can be done most simply as follows:

Instead of making a wax cone as in Fig. I., make a bell-shaped piece, as in Fig. III. With a sharp file nick the bulb where the end of the wire will come. The purpose of this nick is to help the spark puncture the glass. It should not be made deep enough to allow any air to enter the bulb. Next stick the wax bell on the bulb so that the end of the wire rests in the nick. Connect to the coil as before, and turn on the current. The spark will jump through the glass and whatever air is in the bell will leak into the bulb. By varying the size of the bell different colored glows may be obtained. The wax bell in Fig. III. shows about the size for the best results with 16-candle-power lamps. Different lamps give different results, so that the exact size of the bell cannot be determined, and striations are more or less a matter of luck. Almost every bulb made as above will show beautiful color effects, each different from the other, and the results are well worth the trouble.

CONSTRUCTION OF A SIMPLE ELECTROLYTIC INTERRUPTER.

BY GEORGE F. WORTS.

The electrolytic current interrupter described here may be used in place of the troublesome vibrator on spark coils. It is to be operated on 50 to 220 volts

direct or alternating current. The interruptions obtained with this type of interrupter are very high, being in the neighborhood of 1,000 per second.

The electrolyte and electrodes are contained in a wet battery jar. A wood plug should be turned to fit tightly in the top of the jar, and boiled thoroughly in paraffin to protect it from the acid fumes. A glass-tube 6 inches long with an internal diameter of $\frac{1}{8}$ inch should be procured, and a hole slightly larger than the external diameter of the tube bored through the center of the wood cover. The tube is held in position by a heavy brass spring pressing against it. For the anode a $\frac{1}{8}$ -inch round brass rod should be straight-

A SIMPLE ELECTROLYTIC INTERRUPTER.

ened, so as to slide very easily through the glass tube. One end of the rod should be squared off, and the other end threaded and a tapped brass ball fitted to it. This weight, by gravitation, feeds the rod into the solution as it is used. One side of the ball should be tapped and fitted with a binding post for connecting purposes. The cathode consists of a lead strip, 6 by 1 by $\frac{1}{8}$ inch, suspended in the solution from a machine screw, the threaded end of which terminates in a binding post for connections. To assemble: Fill the jar a third full with a 10 per cent solution of sulphuric or nitric acid; place the wood cover on firmly, lower the glass tube through the hole till it is $\frac{1}{8}$ inch from the bottom of the jar, and tighten the spring against it. Then put the rod through the glass tube till it is resting on the bottom of the jar. In use, when the circuit through the apparatus is closed, non-conducting bubbles form and break on the anode, thus interrupting the current. If the interrupter is used on alternating current, the anode will wear down quickly. Connections using alternating current are identically the same as direct, but without regard to polarity, as alternating current constantly reverses poles. If intended for continuous work, the electrolyte should be cooled by running water through a coiled glass tube in the bottom of the jar. This interrupter will successfully operate coils from the small sizes up to the 10-inch size, and is especially desirable in wireless telegraphic transmission, as it aids materially in the production of a penetrating, high-frequency wave.

DEVICE FOR TESTING ELECTRIC WIRING.

BY HOWARD M. NICHOLS.

In testing electric wiring for open circuits, grounds, or short circuits, it is often necessary to skin the insulation from the wires under test, in a number of places, so as to connect them to a magneto or other testing device. The accompanying illustration shows

TESTING NEEDLE FOR INSULATED WIRE.

a device which does away with this necessity; for it contains a sharp needle point, which can be easily pushed through the insulation until it makes a good electrical contact with the wire within. The device is made out of a hard wood handle, bored throughout its whole length to the diameter of flexible lamp cord. The small end is then counterbored to a larger diameter and a plug is made that will drive tightly into the counterbore. The next step is to procure a large-sized sewing needle, which is driven through the plug as shown in the sketch. The eye end of the needle is soldered to a length of lamp cord which is passed