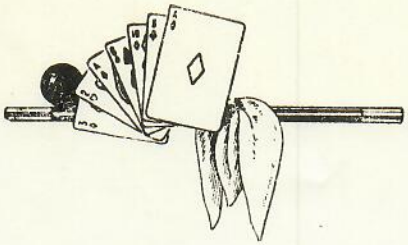

MILE-HI MAGICIANS
of
DENVER, COLORADO

DO-IT-YOURSELF
CHEMICAL MAGIC BOOK

James B. Evans

DO-IT-YOURSELF CHEMICAL MAGIC

represents some of the best and most practical effects achieved by chemical means which have been selected by the Chemical Magic Committee of the Mile High Magicians Club of Denver, Colorado.

The Chemical Magic Committee consists of: Tony Borrillo, Jim Evans, Ken Gaunt, Bruce Spangler, and Paul Wilkinson.

These lecture notes have been written by Jim Evans, who has tested all of the effects described, and takes full responsibility for the accuracy of the directions. The notes were reproduced on multilith by Ken Gaunt.

Sources of supply are given whenever possible. Perfect brand of chemicals are available in 1 oz. bottles in most hobby shops, and represent the most practical means of obtaining small amounts of a wide variety of chemicals. Measure all quantities with care, using standard measuring cups and spoons--don't guess. There is a surprising variation in tap water from one community to another. All of the effects described worked satisfactorily with tap water in Boulder, which is exceptionally pure. If you experience difficulty, try using distilled water which is available at all grocery stores. When performing shows in different locations, always take your own water with you.

The author claims no originality for any of the effects, all of which have been in the scientific literature and various books on chemical magic for years. He is indebted to Harold E. Theper of St. Ann, Missouri, for the inspiration of writing up the notes and for the method of making the paper flowers described in Color Changing Bouquet.

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WINE AND WATER
(Standard version)

Effect: The performer introduces a tray containing a pitcher of water and four empty drinking glasses, and requests the assistance of a young spectator from the audience. Performer instructs the assistant to pour a glass of water and then demonstrates how it should be done. When the spectator duplicates the performer's actions, however, his galss becomes filled with a rose colored liquid resembling wine. Appearing surprised, performer again demonstrates how to pour glass of water. Spectator (who this time carefully checks galss to make sure it is empty) ends up with sine. Performer then takes one of the glasses of wine from the spectator and mixes it with a glass of water (by pouring back and forth) and requests spectator to do likewise. Although the performer then has two glasses of clear water, the spectator has two glasses of wine. Spectator then pours his glasses of wine back into the pitcher. When the performer adds his glasses of water, the entire pitcher becomes clear. (This routine is very similar to that for an ink and water effect published in the Linking Ring, February 1965, p. 100, to which the reader is referred).

Materials: A one-quart transparent pitcher or carafe; 4 eight or nine oz. drinking glasses; phenolphthalein solution (Perfect No. 729); trisodium phosphate (Perfect No. 749, or paint store); sodium bisulfate (Perfect No. 735) or tartaric acid (Perfect No. 748).

Preparation: Measure 28 oz. of water into the pitcher, and then dissolve in it $\frac{1}{4}$ tsp of trisodium phosphate. Glass (1) is unprepared. To glass (2) add 10 drops of phenolphthalein solution and swirl around sides and bottom of glass until the alcohol has evaporated. The glass will now appear to be empty. Add $\frac{1}{4}$ tsp of sodium bisulfate or tartaric acid to glass (3) and dissolve it in about 1 tsp of water. Glass (4) is prepared like glass (2).

Presentation: Performer pours from pitcher into glass (1) until about 2/3 filled. Spectator pours into glass (2). Performer pours into glass (3). Spectator pours into glass (4). Spectator mixes glasses (1) and (2). Performer mixes glasses (3) and (4). Spectator pours his two glasses back into the pitcher. Performer adds his two glasses.

Comments: Since both the phosphate and phenolphthalein are laxatives, it is not advisable to taste any of the solutions. Tartaric acid is somewhat preferable to sodium bisulfate, since being a weak acid, there need be no concern about splashing the solution either on the hands or clothing. If using sodium bisulfate, some care should be exercised with the strong solution originally in glass (3).

For a surprising finish to the routine, rather than returning the wine and water to the pitcher, the glasses may be poured alternately into a clear glass cylinder which has previously been covered with a decorated fiber tube. When the tube is removed the spectators expect to see the cylinder filled with diluted wine; however, it now contains four discrete layers of wine, water, wine, and water. The effect is accomplished by secretly introducing a

transparent plastic tube, on which two bands of wine colored paint have been applied, over the glass cylinder at the time it is covered with the fiber tube. For the cylinder, use a glass candle jar measuring about 9 x 3 in. from a hobby shop. Form a tube around the outside of the cylinder with clear acetate sheet (from a drafting supply store) and cement the seam with Duco cement. Spray two bands of wine colored paint on the acetate (Practa Soft-Spray 'Namel, Candy Raspberry S45, available at all hobby shops, matches the shenolphthalein color perfectly).

To add real class, go to the trouble of using stenware instead of tumblers and a clear glass pitcher of modern design. With good lighting, this is a very pretty effect to watch.

WINE AND WATER
(Port wine color)

Materials: Sodium salicylate (drugstore); 5% ferric chloride solution (Perfect No. 759); oxalic acid crystals (drugstore); pitcher and glasses.

Preparation: Dissolve $\frac{1}{4}$ tsp of sodium salicylate in 28 oz. of water in the pitcher. Glass (1) is unprepared. To glass (2) add 2 drops of 5% ferric chloride solution. Add 1/8 tsp of oxalic acid to glass (3) and dissolve it in about 1 tsp os water. Glass (4) is prepared like glass(2).

Presentation: As previously described.

Comments: This version of the wine and water trick has the advantage that the color developed looks exactly like wine, rather than the somewaht strange (although pretty) color which phenolphthalein develops. Measure the ferric chloride solution with care. One drop produces rose wine, 2 drops produce port wine, and 5 drops produce a color so dark it almost resembles ink. The disadvantage of this method is that the ferric chloride solution has a noticeable yellow color. Although the audience cannot see the 2 drops in the bottom of the glass, an assistant certainly would. Hence, it is preferable that the preformer do the trick himself, pouring from the right hand to produce water and from the left hand to produce wine, etc.

Oxalic acid is poisonous, so don't taste the solutions.

THINK MILK

Effect: Performer proposes a novel solution to the smog problem by causing the air pollutants to dissolve in the ocean, and offers to demonstrate the principle on a small scale. He pours a glass of water from a clear glass pitcher and hands it to a spectator to hold. He then moves several feet away, lights a cigarette, and blose the smoke toward the glass. As the smoke concentrates in the liquid, it is seen to gradually become cloudy and finally resemble a glass of milk.

Materials: Sodium thiosulfate (Perfect No. 742 or photographer's hypo); sodium bisulfate (Perfect No. 735); special pitcher; 9 oz. drinking glass.

Preparation: The pitcher is designed to keep two solutions separated until the contents are poured into a glass. It is easily constructed by cementing a 2 oz. straight-sided glass or plastic vial (drugstore) into a 9 oz. clear glass cream pitcher having a cut glass decoration (dimestore). Dow Corning glass and ceramic adhesive (dimestore) works well for this. The proper position for the vial will have to be determined by experiment.

Dissolve $\frac{1}{4}$ tsp of sodium bisulfate in 1 and $\frac{1}{2}$ oz. (3 tsp) of water and place in the smaller compartment of the pitcher. Dissolve $\frac{1}{2}$ tsp of sodium thiosulfate in 5 oz of water and place in the larger compartment.

Presentation: Pour the liquids from the pitcher into an empty glass with a flourish, to achieve as much mixing as possible. The solution will remain clear for at least 20 sec.; in 30 sec. a cloudiness becomes visible and within 2 min. the liquid resembles milk.

Comments: The concentrations of the solutions are not critical, and may be varied to suit your requirements. Increasing the concentration speeds up the reaction, and decreasing the concentration delays it. Temperature has a marked effect upon the reaction rate. If the solutions are cold the reaction proceeds more slowly.

Instead of showing the gradual color development, you may wish to cover the glass with a cloth and remove it 1 or 2 min. later to show a glass of milk.

Since the solution gradually evolves sulfur dioxide gas which has an unpleasant odor, it should be disposed of shortly after the completion of the effect.

THINK WINE

Effect: Performer proposes an experiment in mass hypnosis--that he can make the audience believe thay see something which actually does not exist. Performer proceeds to pour a glass of clear water from a pitcher. As the audience intently watches the glass, accompanied by suitable hypnotic suggestions from the performer, the water abruptly changes into wine.

Materials: 37 solution of formaldegyde (drugstore); sodium bisulfite (Perfect No. 736); anhydrous sodium sulfite (photo shop); phenolphthalein solution (Perfect No. 729); 9 oz. drinking glass; special pitcher (described under Think Milk).

Preparation: Prepare two stock solutions as follows:

Solution A: Dissolve 9.7 g. of the 37% formaldehyde solution (about 2 tsp) in 8 oz. of water. Stir thoroughly.

Solution B: Dissolve 8.3 g. of sodium bisulfite (about 1 and $\frac{1}{4}$ tsp), 2.5 g. of sodium sulfite (about $\frac{1}{4}$ tsp, heaping), and 50 drops of phenolphthalein solution in 28 oz. of water. This solution should be made up in a 1 quart bottle, and must be shaken thoroughly to insure complete mixing.

The stock solutions should not be prepared more than 24 hours in advance of the performance. When ready to perform, place 1 and $\frac{1}{2}$ oz. (3 tbsp) of solution A in the smaller compartment of the pitc her, and place 5 oz. of solution B in the larger compartment.

Presentation: Pour the liquids from the pitcher into an empty glass with a flourish, to achieve as much mixing of the two solutions as possible. In 25 to 30 sec. the clear liquid will suddenly change into wine.

Comments: This is a very versatile reaction which is relatively unfamiliar, even to chemists. Since the color is developed because the solution suddenly changes from acidic to basic, any of the indicators listed under Color Changing Bouquet may be used. If a little cadmium nitrate (chemical supply house) is added in place of the phenolphthalein, a glass of milk will be produced.

All measurements must be made as accurately as possible. Prepare the stock solutions as directed, and then try the effect. If the color develops too soon, dilute both solutions with the same proportion of water (e.g., add 2 oz. of water to 4 oz. of solution A, and akk 10 oz. of water to 20 oz. of solution B). If the color develops too slowly, add a little more formaldehyde to stock solution A. Then try the effect again, and make any further adjustments as required. If the stock solutions are prepared as directed, there will be enough for four trials and one final performance. Once the solutions are properly prepared, the reaction time is very reproducible. As with Think Milk, temperature has a marked effect on the reaction rate.

Since a transparent paint is available which perfectly matches the phenolphthalein color (described under Wine and Water), a clever transposition effect may be worked out. A piece of acetate sprayed with the paint and then inserted into a glass of water will give the appearance of being full of wine, even at close range. To change into water, cover the glass with a cloth and nip out the piece of acetate when removing the cloth from the glass.

COLOR CHANGING BOUQUET

Effect: Performer explains that most of the colored carnations now on the market are actually white carnations which have been dyed--the white carnations being a sturdier variety and easier to grow. He offers to demonstrate how the process works, including some improvements of his own. Introducing a bouquet of white carnations, he proceeds to spray them lightly with a single solution from a plastic squeeze bottle, whereupon the bouquet blossoms forth in an array of several brilliant colors. He then blows upon the bouquet and the blossoms begin to fade, finally returning to their original colorless state.

Materials: White paper or cloth flowers attached to green plastic foliage; 1% alcoholic solutions of the following indicators: phenolphthalein (red), ortho-cresolphthalein (purple), meta-nitrophenol (yellow), and thymolphthalein (blue); ordinary household ammonia (clear, non-detergent) in a plastic spray bottle (an empty anti-perspirant bottle works fine). Although phenolphthalein solution is readily available (Perfect No. 729), a chemist friend will have to prepare the other indicator solutions for you.

Preparation: To make the paper flowers, proceed as follows. Open out and lay on top of each other three standard size Kleenex tissues. Cut a narrow strip from each of the long outside edges with pinking shears. Separate each of the double tissues, ending up with six single plies. Fold each of these in half lengthwise, aligning the picoted edges, and then gather in $\frac{1}{4}$ in. accordion pleats. Gather five of these bunches together, even up the folded ends, and fasten securely with wire. Wrap the base of the flower and the stem wire with green floral tape, and then fluff out the flower by separating the double tissue layers which are sticking together. Spray the flower lightly with one of the indicator solutions--don't drench it. When dry, attach to plastic foliage.

Just prior to presentation, dampen the flowers by spraying them with plain water, and keep the bouquet in a plastic bag to prevent its drying out.

Presentation: Remove the bouquet from a regular florist's box, and spray with the ammonia. Alternatively, set the bouquet in a wide mouth vase in which some concentrated (30%) ammonium hydroxide solution has been placed. Blow on the flowers and as the ammonia evaporates, the colors will fade. This is also hastened by the carbon dioxide in your breath.

Comments: The flowers must be damp to work effectively. Should the yellow flower fail to bleach out completely, spray it with white distilled vinegar. Allow the bouquet to dry thoroughly before storage, and it should last for years.

SYMPATHETIC COLORS

Effect: Performer offers to attempt an experiment in magical silk dyeing. He introduces a tray containing a clear glass pitcher of water, four empty drinking glasses, and a tall glass cylinder with a fiber tube cover. When he pours the water into the first glass, it becomes filled with a blue liquid. The other glasses become filled with red, yellow, and green liquids. He sets the pitcher aside, shows the fiber tube to be empty, and places it over the glass cylinder (explaining that light interferes with the setting of the dyes). He then empties each of the glasses of colored liquid into the cylinder. He pokes a white silk handkerchief into the cylinder and a moment later pulls it out dyed red. This is repeated for the other colors. Finally he stirs the liquid in the cylinder, and this time the silk is dyed in rainbow colors. He removes the fiber tube and again shows it to be empty. Since the dyes have now been used up, the cylinder is filled with clear water which he pours back into the pitcher.

Materials: Chlorox laundry bleach; various bleachable dyes (any of the washable inks may be used, as well as many food colors--experiment); pitcher and glasses; glass cylinder (obtain a candle jar from the hobby shop); a phantom tube constructed from cardboard to fit the cylinder.

Preparation: Place ordinary water in the pitcher. Place 10 drops of the various colored inks in the bottom of each glass. Place 1 tbsp of Chlorox in the bottom of the glass cylinder. Load the phantom tube with the colored silks.

Presentation: As described under effect. Working is automatic.

Comments: The same effect may be achieved using the acid-base indicators described under Color Changing Bouquet, trisodium phosphate solution in the pitcher, and tartaric acid solution in the bottom of the cylinder. However, the method described above works satisfactorily and permits a greater range of colors. The bleaching action of the Chlorox is complete within a few seconds.

BLUE BOTTLE EXPERIMENT

Effect: Performer exhibits a clear glass bottle half-filled with water. He gives the bottle a gentle shake, whereupon the water changes dark blue in color. After a few minutes, the blue color fades away. The effect may be repeated many times. This is an interesting novelty item to try for your own amusement. It might also be used as a running gag throughout the show.

Materials: Light (clear) Karo corn syrup (grocery store); Lewis lye drain cleaner (grocery store); methylene blue solution (aquarium department of dimestore or pet shop); 16 oz. bottle with screw cap (a bottle similar to that in which the Karo syrup comes is fine).

Preparation: Pour 8 oz. of water into the bottle. Add 1/2 tsp of lye, and swirl the bottle until the lye is dissolved. Then add 1/2 tsp of Karo syrup, and swirl again. Finally add 2 drops of the methylene blue solution and swirl.

Presentation: Shake the bottle gently, so that there is some splashing of the liquid. A dark blue color will develop with a few seconds and then slowly fade back to colorless.

Comments: The more vigorous the shaking, the deeper will be the color and the longer it will persist. Don't overdo it. Make sure the cap fits securely, since the solution is caustic and should not be spilled on either the skin or clothing. When the methylene blue is first added, the solution will remain dark blue for several minutes before fading; subsequent fading is much faster. If prepared as directed, the solution should be good for several hours before it decomposes.

The original recipe called for 20 g. of sodium hydroxide, 20 g. of dextrose, and 0.5 ml. of 1% alcoholic methylene blue made up to 1 liter with water. Although dextrose may be obtained from the drugstore, the Karo syrup works quite satisfactorily.

NOVEL CARD REVELATION

Effect: Performer proposes to invoke the aid of the spirit world in revealing the identity of a card previously selected by a spectator. Upon touching a lighted cigarette to a sheet of paper, the name of the selected card mysteriously burns across the page, the remainder of the sheet being unharmed.

Materials: A sheet of good quality tissue paper, about 8 x 10 in.; soft bristled artist's water color brush, fine; sodium nitrate (Perfect No. 773, or drugstore).

Preparation: Make a saturated solution of sodium nitrate by dissolving 1/2 tsp of the solid in 1/2 tsp of water (warming will speed the process). Some of the solid should remain undissolved. Write the name of the card on the tissue, using the brush dipped into the solution. Make sure that the line is continuous and avoid letters with closed loops (such as o), since the center will drop out when it burns and make the writing harder to read. Allow the prepared tissue to dry thoroughly.

Presentation: Force a card upon a spectator. Introduce the tissue, and touch a lighted cigarette to one end of the prepared message. The writing will burn across the sheet in a few seconds, consuming only those areas previously painted with the solution.

Comments: It is advisable to place a pencil mark on the spot to be touched with the cigarette, since the prepared writing itself will be invisible when dry. A sheet of black paper behind the tissue will increase the visibility of the message. Although heavier writing paper will also work, the rate of burning is much slower and hence less effective.

MAGICAL SMOKE AND FIRE

Although there are many formulas for producing smoke and fire, most of them are pyrotechnic in nature and have the disadvantage of being hard to ignite, dangerous to formulate and store, and generate very irritating products. Some simple, though not the most spectacular, means of producing smoke and fire which are relatively non-irritating are described below.

Fumes from concentrated 37% hydrochloric acid and 30% ammonium hydroxide produce a white smoke when they come in contact. In the classic method of working the smoking clay pipes, for example, a small ball of cotton wet with the acid is placed in one pipe bowl and a similar ball wet with ammonia is placed in the bowl of the other pipe. Whenever the pipes are brought in close proximity to each other, smoke is spontaneously evolved. If an arrangement for bubbling air first through a flask containing some of the acid and then through a flask containing some ammonia is devised, a veritable smoke screen can be produced in a few seconds. Although the smoke itself consists of ammonium chloride which is non-toxic, the concentrated acid and ammonia solution must be handled with care, avoiding contact with the skin or clothing.

A few chemicals spontaneously react with moisture in the air to produce a smoke. Bruce Spangler (1371 S. Grant Street, Denver 80210) markets one of these through various dealers under the name of "Instant Stage Smoke". The chemical is conveniently packaged in break-seal ampules, and comes in various strengths. To produce smoke, simply snap off the top of the ampule--the chemical does the rest. The reduced strength chemical may be applied to the finger tips to produce an eerie effect.

Lycopodium powder, available from chemical supply houses, burns with a flash when ignited in a finely dispersed state. A tiny plastic doll baby bottle about 2 in. high, available in the toy department of dimestores, makes a convenient dispenser. The bottle should be about half-filled with the powder. A combination quick shake (as if throwing a dart) and squeeze produces a nice dispersion, which if directed over an open flame from a match or candle, results in a startling flash of fire. For illusions, the same principle may be scaled up in size. Solder a small funnel to a piece of copper tubing, and then solder this through the wall of a copper flower pot. Attach a length of rubber tubing which leads to a source of compressed air, such as a bellows arrangement or air pump (or even your own breath, if you have strong lungs). Place about 1 tsp of lycopodium powder in the funnel, and then affix a small candle to the bottom of the pot. Disperse the powder with a sudden puff of air, and a sheet of flame some 4 to 5 feet high will result.

HYPNO HEAT

Effect: Performer offers to attempt an experiment in hypnosis, and explains that he will cause a spectator to believe an object which he is holding is becoming very hot, even though logically he knows it couldn't be. Performer then shows a small piece of aluminum foil which he crumples into a loose ball and gives to spectator. He begins to make hypnotic suggestions of heat, and spectator agrees that the foil is indeed getting warm, and frequently becomes too hot to hold.

Materials: Small square of aluminum foil, about 2 x 2 in.; saturated solution of mercuric chloride (from a chemist friend).

Preparation: Saturate a small sponge contained in a plastic box with the mercuric chloride solution, or arrange some other means of getting the solution on the finger tips or thumb when required. Just prior to crumpling the foil, smear the solution over the underside of the foil and fold this to the inside. The subsequent oxidation of the aluminum produces the heat.

Comments: Caution must be exercised. Mercuric chloride is a violent poison and 1 tbsp or less of the saturated solution is fatal. Don't apply the solution to your fingers if there are any cuts or open sores, and wash the hands thoroughly after performing.