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HANDLING AND PRESERVING BLOOD ALCOHOL TEST SAMPLES

Lowell W. Bradford

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As an investigative technique the quantitative determination of alcohol in the human blood has several applications. Among the more common are: (1) Drunk driving; (2) auto-auto accidents, auto-pedestrian accidents, and witnesses thereto; (3) drunk pilots; (4) homicide victims, perpetrators, and witnesses; and (5) establishing cause of death in toxicology. Chemical tests on blood samples from the individuals concerned represent an accurate means of determining blood-alcohol ratios, and the points discussed in this paper are drawn from the author's experiences with these tests.

In the course of events which lead to the ultimate introduction of blood alcohol test evidence in court proceedings, it is necessary to provide means whereby the evidence will be acceptable under the "rules of evidence." In brief, these following elements are pertinent and are measures which should be taken by the investigators to insure this acceptance.

1. Provide an intact chain of possession from person drawing blood sample to analyst.
2. Assure identification of the sample.
3. By a positive means prevent access to the sample to prevent deliberate contamination.
4. Use a blood container which is free from the possibilities of accidental contamination.
5. Use means of sample preservation which will introduce no change in the alcohol content.

It is the purpose of this paper to discuss in detail each of these requirements.

1. *Chain of Possession*—2. *Identification of Sample*. In order to meet the constant courtroom challenge of preserving the chain of possession of the blood sample under a variety of conditions, an envelope was designed to accomplish this purpose.

The face of the envelope is shown in figure 1. This attempts to provide a permanent record of all of the data pertinent to the particular

INVESTIGATING OFFICER'S DATA SHEET FOR BLOOD ALCOHOL ANALYSIS (To Be Filled in by the Officer)	SEAL WITH SCOTCH TAPE											
1. Officer's Case No.	INSTRUCTIONS TO THE DOCTOR OR TECHNICIAN DRAWING BLOOD 1. Do not use a volatile organ'c solvent to cauterize the skin (no alcohol). Use 1/1000 Mercuric Chloride. 2. Draw 5 ml. of blood. 3. Place blood in a clean, dry test tube at least 16mm in diameter, containing 30 milligrams of oxalate or citrate, and with a clean rubber stopper. If a ground glass stopper is used, be sure that it is securely affixed under tension with rubber bands. 4. The blood must be well mixed with the oxalate crystals by slowly slipping from end to end. Clotting must not occur. 5. The test tube must be labeled with the subject's name, date, and identified with the initials of the person drawing the blood. The label should be gummed and affixed firmly to the tube. 6. Storage must be at less than 42° F. 7. Deliver or INSURE Parcel Post to: Criminology Laboratory, County Hospital, San Jose.											
2. Photographer's Case No.												
3. Laboratory Case No.												
4. D.A. Case No.												
5. NAME OF SUSPECT FROM WHOM BLOOD WAS TAKEN												
6. Enforcement Agency Submitting blood for analysis.												
7. Officer's Name.												
8. Date.												
9. Time.												
10. Place Where Specimen Taken.												
11. Doctor or Technician Who Took Specimen.												
12. Physical Examination by.												
13. Doctor's Opinion: Under Influence <input type="checkbox"/> Not Under Influence <input type="checkbox"/>												
14. Laboratory Report of Blood Alcohol Content Done by the Modified Method of Kazalke & Hine, Reported in Terms of Percent (Grams of Alcohol per 100 ml. of Blood).												
<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Percent</td> <td style="text-align: center;">Date</td> </tr> <tr> <td colspan="2">15. CHAIN OF POSSESSION OF THE BLOOD SAMPLE:</td> </tr> <tr> <td>Name</td> <td>Inclusive Dates</td> </tr> </table>		Percent	Date	15. CHAIN OF POSSESSION OF THE BLOOD SAMPLE:		Name	Inclusive Dates	Name	Inclusive Dates	Name	Inclusive Dates	Name
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FIGURE 1

Front and Back View of Envelope for Blood Alcohol Samples

This envelope, 6 by 3 $\frac{3}{8}$ inches, is of sufficient size to hold glass vial containing blood sample. Both top, open flap and lower, sealed flap are secured with scotch tape by the investigating officer before transmitting sample to the laboratory to insure that sample is not tampered with.

case in question. An examination of the reverse side of the envelope indicates instructions which have been found to be necessary and of practical importance through experience.

The envelope is filled with the following articles in the laboratory so that law enforcement officers can have all of the material necessary for the accomplishment of the instructions: (1) Ground glass stoppered 5 ml. vial containing 30 mg. potassium oxalate, (2) rubber bands for securing vial, (3) gummed label, and (4) scotch tape tab.

It is necessary for the person drawing the blood sample to initial the vial label so that he will be able to make a positive identification of it when testifying in court. This is the beginning step of the chain of possession. The officer then places the vial in the envelope, seals the envelope with scotch tape, and fills out the data sheet on the face of the envelope.

If the sample is transmitted through other hands to the analyst, the signatures of these persons are written under paragraph 15 of the

envelope. The chain of possession is completed by the analyst who is the last to sign under paragraph 15.

During the past twelve months, 44 contested cases were tried in Santa Clara County wherein chemical tests for alcohol in the blood were made. In ten of these cases, the chain of possession was a particular issue. Because of the use of the envelope and procedure described above, the chain of possession was in each case satisfactory to the court, and expert testimony regarding the results of the analysis was then admitted.

3. Preventing Access—4. Prevention of Container Contamination. Prevention of deliberate contamination is demonstrated in court by the fact that the two gummed flaps of the envelope are positively sealed with scotch tape provided by the tab. Opening at the time of analysis is done by slitting the bottom of the envelope, thus preserving the seals.

Rubber stoppers in blood vials have proven to be the source of accidental error in past experience. Volatile oxidizable compounds from the stopper have been found to contaminate known samples as controlled tests have proven. For this reason special ground glass stoppered vials were obtained to obviate this possible source of error.

The cleaning of sample vials and sterilizing of needles and syringes must be controlled so that chance contamination by oxidizable volatiles is prevented. These volatiles include alcohol, ether, acetone, and the like.

5. Preservation. A clot prevention preservative in the form of oxalate or citrate is used to maintain the blood in a liquid condition. There is some question as to the change of concentration of alcohol in the blood with time. Elimination of changes is desirable so that the blood may be tested by the defendant or third parties at any time up to the trial.

Changes can be in either direction depending upon conditions. Enzymatic changes of the oxidative type can cause a decrease in alcohol content, or the fermentation type may cause an increase in alcohol content. These enzymes may all be inhibited by the use of enzyme poisons, the most common of which are ions of heavy metals, cyanide, fluoride, and sulfhydryl compounds. Likewise, enzyme reactions may be inhibited by refrigeration. The use of fluorides and cyanides is undesirable because of their toxicity and because fluorides will etch glassware. The simple use of refrigeration plus a non-clotting reagent gives satisfactory results for periods of storage of a week or two. However, additional preservation is desirable for longer periods of time.