Instructions

Collection of Breath Alcohol Specimens

Using

Mobat Sober-Meter Model SM-7

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INSTRUCTIONS FOR COLLECTION OF BREATH ALCOHOL SPECIMENS

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OBJECTIVE

The objective of this manual is to assist the law enforcement officer in learning the proper procedures for collection of a breath specimen, utilizing the Mobile Breath Alcohol Test Kit, (MOBAT), model SM-7.[1]

The MOBAT is designed to be portable; therefore, it is most useful when officers carry them in the glove compartments of their vehicles. This makes breath testing available at the scene, which insures more accurate results nearer the driving time in question. The kit will remain good for a number of years. The SM-7 is a one-time kit, to be used once only. This prevents contamination and guarantees the subject and officer new equipment for each sobriety test.

This manual, which is used in connection with training courses conducted by the Idaho Department of Health and Welfare, Bureau of Laboratories, should be reviewed and studied after the course has been completed. It is recommended that the officer carry a copy of this manual in the glove compartment of the patrol car for reference.

[1]This test kit is manufactured by Luckey Laboratories, Inc., San Bernardino, California.

HISTORY

Motor vehicle accidents are the leading cause of death in Idaho in the 15 to 34 year age group. Laboratory studies performed on blood specimens from dead drivers indicate that approximately half of all fatal motor vehicle accidents in Idaho involve a driver who has been drinking. The experience in England suggests that a reasonable blood alcohol legal limit, coupled with good law enforcement and adequate laboratory testing programs can significantly reduce the number of fatal motor vehicle accidents.

In 1963, the Idaho State Police, in conjunction with the Idaho Department of Health, instituted a breath and blood alcohol testing program. The first instrument used was the Intoximeter.[2] This type of collection kit was quite inconvenient to use and the preparation and analysis was laborious for the laboratory chemist. In 1965, the first Sober-Meter Kit (Mobile Breath Alcohol Test, SM-2 model) was introduced in Idaho. This kit was first used exclusively by the Idaho State Police, but it was soon adopted by most of the other law enforcement agencies within the state. Now, a second generation MOBAT has evolved, Model SM-7. This new instrument utilizes the direct collection of a representative sample of alveolar or deep lung air by means of a volumetric bag connected to the collection tube.

[2]This mobile breath collection kit was manufactured by Intoximeter Association, Niagra Falls, New York.

The use of the breath alcohol test can overcome many of the problems related to blood alcohol testing; however, due to the many variables associated with breath collection, the breath sample must be collected in the proper manner. The information contained in this manual is designed to assist law enforcement officers in learning the proper specimen collection procedure using the Mobile Breath Alcohol Test Kit, Model SM-7. With proper training, the officer will become an expert in the collection of breath samples. The breath specimen will then be submitted to a chemist, who is an expert in this type of analysis. This system works most satisfactorily because both the officer and the chemist are doing the work they were trained to do. This gives a greater assurance to the court and the defendant that the final results are accurate and valid. The MOBAT also provides the officer with a field test, which gives him/her a rapid approximation of the amount of alcohol present in the subject's blood. This field test may aid the officer in making a decision as to the subject's sobriety by indicating an approximate blood alcohol concentration.

OPERATION OF SM-7 MOBILE BREATH ALCOHOL TEST KIT (MOBAT)

CHECK LIST

1. ( ) Before testing, avoid smoking and wait 15 minutes after an alcoholic drink.

2. ( ) Remove caps from ends of collection tube (the tube with the white chemical), and attach the square plastic volumetric bag.

3. ( ) Attach collection tube to balloon's clear plastic sleeve.

4. ( ) Remove caps from the field tube (the color tube), and discard the preservative crystals. Replace one cap.

5. ( ) Direct the subject to inflate the balloon with full, continuous, uninterrupted breaths. The first part of each breath is expelled into the waste bag on the front of the balloon. (Squeeze the air out of the waste bag before each new breath.) Repeat this procedure as needed to fill the balloon to match the inflation guide with the small end of the box cover.

6. ( ) Remove the collection tube when the volumetric bag is full and replace with the field test (color tube). Refill the balloon to match the inflation guide. Allow air to pass through the field tube by removing the end cap for exactly one minute.

7. ( ) Replace all caps on both tubes securely, seal the carton, and fill out the required data on the reverse side of the box.

EXPLANATION OF THE CHECK LIST

An explanation of each step will be included here for the information of each officer.

General Preparation:

Before opening the kit, be sure to check the box to insure that the kit is sealed. Upon opening the kit, observe how the contents are packaged so that you might repackage the test upon completion in the same manner; also, note if there appears to be any physical damage to any parts in the kit. (If damaged, obtain new kit.)

Step 1:

Tobacco smoke contains material which discolors the field tube and chemist tube. Since the field tube reading is determined by observing a color change, allowing the subject to smoke could create difficulty in reading the final result of the field tube. Asking the defendant to refrain from smoking is also a good safety measure - avoiding a broken or popped balloon. Thus, as a matter of policy, do not allow the subject to smoke while taking the tests.

It is important that fifteen minutes elapse after the last alcoholic drink. This step is to eliminate the possibility that any of the alcohol from a recent drink might still be in the oral cavity. Studies have shown that alcohol vapors remain in the mouth cavity for 10 - 15 minutes after drinking an alcoholic beverage. Also, make sure the subject does not have any chewing tobacco or other wad of material in his/her mouth which might entrap alcohol and allow it to remain in the mouth.

Therefore, the 15 minute waiting period is essential before proceeding with this test. This 15 minute wait will also allow the subject to calm down in case he/she is breathing rapidly from exertion caused by exercise, etc. A breath test of any type should not be given when the subject is momentarily breathless. This condition will probably last only a few minutes; by the time the 15 minute waiting period is completed, the subject should have resumed normal breathing. If the subject has regurgitated, belched, or by any other means re-introduced alcohol into the mouth, the officer must wait an additional 15 minutes.

Step 2 & 3:

After removing the caps from the collection tube (tube with white chemical) attach to the clear plastic sleeve of the square volumetric bag. This is done by simply inserting the collection tube inside the clear plastic sleeve (approximately 1/8" - 1/4"). The volumetric bag is a measuring device. The collection tube collects the ethanol vapors

from the deep lung air as it passes into the volumetric bag. Thus, you are collecting the amount of ethanol that would be present in this bag. The amount of ethanol collected from the air in the volumetric bag is designed to correspond to the amount of ethanol that is present in one cubic centimeter of blood. However, in most cases, the blood alcohol level calculated from the SM7 will be lower than the blood alcohol level as calculated directly from a blood specimen. To perform the volume measurement correctly, make sure that the volumetric bag is deflated completely at the beginning of the test. Next, attach the opposite end of the collection tube in the same manner to the clear plastic sleeve of the balloon.

Step 4:

Remove the caps from the field tube (the tube with the yellow bands) and discard all the preservative crystals, then replace one of the caps on either end of the field tube. This is done so that the field tube will be ready for use in Step 6.

Step 5:

It is important that the subject fill the balloon with prolonged expirations of air. The first part of the breath fills the waste bag. It is only the last part of the breath that is the alveolar breath or deep lung air which contains any amount of alcohol in a specific ratio with blood. Failing to expel the first part of each breath that is blown

into the waste bag will dilute the sample, and thus lower the blood alcohol content. It will probably take three or four breaths before there is a sufficient sample to complete this portion of the test. After each breath that the subject blows into the balloon, clear the waste bag by squeezing out the air back through the mouthpiece. Note when the volumetric bag is full and observe the volumetric bag to assure that there is no apparent leaking. The officer should under no circumstances leave the volumetric bag and collection tube connected to the balloon longer than one minute. The volumetric bag is fragile and can be ripped, torn or punctured quite easily--treat with care! BE SURE TO REMOVE THE COLLECTION TUBE FROM THE BALLOON BEFORE REMOVING THE VOLUMETRIC BAG. (You may be asked in court at a later date to demonstrate the procedures you undertook with this mobat.)

Step 6:

After removing the collection tube from the balloon, attach the field tube to the clear end of the balloon sleeve where the collection tube was attached. Have the subject again blow up the balloon to the proper size indicated by the inflation guidelines. (The box lid will fit between these guidelines when properly inflated.) When the appropriate size is obtained, remove the cap from the end of the field tube and allow air from balloon to flow through the tube for exactly one minute. The field tube has been calibrated for just a one-minute run. After one minute has elapsed, remove the field tube from the clear sleeve of

the balloon. It takes approximately five minutes for the color change to take place. When five minutes has elapsed the tube may be read much like a thermometer. Each of the colored rings represents a blood alcohol level of approximately 0.01% to 0.10%; two rings colored indicate 0.10% to 0.20%; and three rings colored indicate 0.20% to 0.30%. Allowing the air to pass through the field tube for exactly one minute gives the officer in the field an approximation of the subject's blood alcohol level. The field test should be read after five minutes have elapsed to allow the green color to fully develop. Once the field tube has been used, the green color may progress through all three rings in time.

REMEMBER: IT IS IMPORTANT TO RUN THE CHEMIST COLLECTION TUBE PRIOR TO RUNNING THE FIELD TEST AND TO REFILL THE BALLOON TO THE CORRECT SIZE FOR THE FIELD TEST.

Step 7:

Replace the caps on both tubes and squeeze the air out of the bags and the balloon. Return all of the components from the test kit back into the kit as neatly as possible. Be sure that the direction check list has been checked and signed. Seal the carton with the enclosed seals. Reinforce the seals by placing scotch tape over each end of the box. Fill in the required data and return or mail the test kit to the proper testing laboratory. W R I T E L E G I B L Y !

Comments:

Most mistakes that might be made with this kit will favor the subject except the occurrence of a leak in the volumetric bag. For a ten percent error to occur, which would change the reading of a 0.10% blood alcohol to either 0.09% or 0.11%, it would be necessary to leak out approximately 210 cubic centimeters of breath. This would be a large leak, which would readily be detected. This problem can be eliminated by following the above procedure and immediately removing the collection tube as soon as the volumetric bag is full. Never leave the collection tube connected longer than one minute.

The procedure for use of the SM-7 is extremely simple, but for maximum accuracy, we suggest that the officer follow the direction check list exactly each time and check each step as it is performed. This is important in the event that the officer has to make an appearance in court. The check list is the best evidence, and from it the officer can read exactly the steps he or she took in administering the kit.

The officer should be careful not to squeeze the balloon to force air through the chemist tube, but simply allow the air from the balloon to flow under its own pressure through the tube into the volumetric bag.

Remember to recap the chemist tube to prevent alcohol from escaping from the tube. This procedure may also prevent contamination from other

substances with which it may come in contact. Situations may occasionally arise where you may not be able to run a field test! If this happens, you still may have a valid test. The collection (chemist) tube is the essential portion of the test which must be finished and accomplished according to the instructions. By not running a field test you will not have an immediate reference as to the approximate alcohol level.

Failing to reseal the kit prior to delivery to the lab may result in problems in court, thus make sure the kit is sealed prior to the delivery to the lab.

The preservative crystals need not be placed back in the field test tube. Once the reaction begins on the field tube, the crystals will not stop the color change. Placing the crystals back into the tube is simply time consuming and serves no beneficial purpose. Please do not put the crystals in the kit. They make a considerable mess at the laboratory when the kit is opened.

If the subject's air escapes back out the mouthpiece from the balloon, two conditions may be the cause:

(1) The check valve is stuck open; this can be relieved sometimes by squeezing the inner valve a few times. (This valve is a small balloon which has a slit in it and is inside the larger balloon.)

(2) The balloon may not have sufficient air pressure to close the valve. Have the subject blow a larger amount of air into the balloon. (The balloon should not be inflated over the size of a basketball.)

If these two steps fail to stop the back leakage from the mouthpiece, and another kit is available, the officer should consider using it in place of the defective one. If a second kit is not available and neither of the above conditions prove effective, the air from the balloon may be kept from escaping back out the mouthpiece by placing a finger over the mouthpiece outlet. This should be done only as a last resort and the officer probably would be primarily concerned with running only the collection (chemist) portion of the test, thus eliminating the field test. If this should be the case, have the subject blow air into the mouthpiece; then place your finger over the mouthpiece and allow the air to flow freely from the balloon through the collection tube and into the volumetric bag (do not squeeze the balloon) until sufficient air has passed through to fill the volumetric bag. It will probably take three to four exhaled breaths to accomplish this.

ALCOHOL INFORMATION

The average police officer in Idaho will not need to testify in court as to the specific physiology of ethyl alcohol in the human body, but a general knowledge of alcohol in the body will give him/her a better understanding of a subject who is arrested for driving while under the influence of alcohol (DWI).

When examining the effects of alcohol on a human body, there are many variables that affect objective symptoms; but, if one looks at very many accident reports and medical studies, it soon becomes apparent that anyone whose blood content is above 0.08 percent should not be driving an automobile. The problem then arises to externally determine an approximate blood alcohol content of a person from objective symptom tests. The first part of the brain to be affected is the frontal lobe section concerned with morals and judgment. The second part to be affected is the middle part of the brain which controls the motor functions of the body. Most of the motor functions performed by humans are learned, and it is very conceivable that a person can learn to walk heel to toe, or even drive at elevated blood alcohol levels. This person may be performing well until an unexpected incident arises that requires reevaluation, integration, quick response or judgment (such as a tire blowout or a bicycle rider swerving into the driving lane). At 0.08

percent blood alcohol content (BAC), a person is six to seven times more likely to have an accident than when one is sober; and at 0.15 percent BAC, twenty-five times more likely to be involved in an accident.

THE FOLLOWING INFORMATION IS FOR YOUR EDUCATION ABOUT ETHYL ALCOHOL AND THE HUMAN BODY:[3]

1. Absorption. Alcohol is typically swallowed and travels from the mouth through the esophagus to the stomach. Here part of the alcohol is absorbed directly into the blood stream by the process of diffusion; the remainder is absorbed in the small intestine. The rate of flow from the stomach to the small intestine is controlled by the pylorous, which opens and closes at the base of the stomach to permit or inhibit the passage of solids and liquids. (See illustration 1.)

   1a. Mouth - Alcohol can be absorbed through the mouth lining; however, the amount is normally insignificant since fluid leaves the mouth rapidly. The mouth of a non-drinker rinsed with liquor will be free of alcohol after about fifteen minutes.

   1b. Stomach - About 25% of the alcohol is absorbed directly into the blood stream through the stomach wall. The exact amount is variable and influenced by the emptying time of the stomach.

   1c. Small intestine - The remainder is absorbed from the small intestine; very little gets past the duodenum (the first 8 to 10 inches of the small intestine.)

[3]Following information taken from: Traffic Safety Commission's Study Guide For the Breath Examiner Specialist Course, and Toxicology - Mechanisms and Analytical Methods, Vol. II, C.D. Stewart and A. Stolman.

1d. Rate - The rate of absorption varies somewhat from person to person and for the same person at different times depending on the condition of the body. However, alcohol begins to pass into the blood stream within 1 to 2 minutes after it is consumed, most alcohol is absorbed within 15 minutes, nearly 90% is absorbed within one hour, and nearly all is absorbed in 1.5 hours. Three hours may be required for complete absorption.

1e. Factors that affect rate of absorption - Absorption through the stomach wall is slow and represents only a portion of total alcohol intake. Absorption through the small intestine is rapid. Therefore, anything that increases emptying time of the stomach increases absorption rate; anything that delays emptying time slows absorption rate. Both dilution of the alcoholic beverage and food in the stomach affect rate of absorption.

*Dilution - Absorption is slow in dilute and strong beverages. It is fastest for a 20% water solution. Apparently very strong solutions irritate the gastrointestinal walls and inhibit absorption.

*Food in the stomach - Food in the stomach delays absorption. Absorption is slowed since stomach emptying time is delayed. This applies to eating while drinking and eating before drinking.

2. Distribution. The alcohol travels from the stomach and small intestine via the portal vein to the liver. From the liver, it travels to the heart, the lungs, and back to the heart from which it is pumped to all parts of the body.

Alcohol has an affinity for water and distributes itself through the body organs and tissues in proportion to their fluid content. Blood circulates through the body at a rate of 3 to 4.5 liters per minute. (See illustration 1.)

3. Elimination. Once absorbed into the blood stream, the body immediately starts to eliminate the alcohol. This is largely accomplished in the liver where the alcohol is oxidized to carbon dioxide and water. Some small portion (less than 10%) is eliminated directly through urine, breath, perspiration, tears and saliva.

3a. Rate of elimination - As soon as alcohol is absorbed into the blood system and travels to the liver, the body immediately starts to eliminate it. The average rate of elimination is reported as 0.015% to 0.018% per hour and varies between 0.01% and 0.025% per hour. At very low BAC's, the average rate of elimination is about 0.01% per hour. For a man weighing 150 pounds, the quantity eliminated in one hour is about 7 grams or 2/3 ounce of 100-proof whiskey. Although there is some controversy in the literature, the preponderant evidence

indicates that the rate of elimination is essentially linear; that is, for any given person at a given time, the rate of alcohol elimination per hour will be essentially constant.

3b. Metabolism - Most alcohol (between 90 and 98%) is oxidized to carbon dioxide and water. The oxidation process takes place in the liver. Since oxidation provides the body with calories, alcohol must be considered a food although it has no direct food value.

4. Blood Alcohol Levels. Many factors affect the height and shape of the BAC curve. Some of these are discussed below.

4a. Body weight vs. drinks consumed - In general, a heavier person can consume more alcoholic beverages than a lighter one to attain the same BAC level. A chart of BAC values for different body weights and drinks consumed is shown in Illustration 2. The example in the exhibit uses an average elimination rate of 0.015% as a means of accounting for the factor of "time since first drink" in estimating BAC. It should be noted again that this rate of elimination is an average rate and, therefore, should be used with caution in making such estimates.

4b. Empty stomach vs. full stomach - Food in the stomach will delay absorption and result in a lower BAC than would be obtained if the stomach were empty. Instead of decreasing

immediately, a plateau at that BAC will be maintained for a longer period of time than if the stomach were empty.

4c. Rate of drinking and quantity consumed - The BAC levels vary depending on quantity of alcoholic beverages con sumed and the rate of drinking.

In general, it may be commented that maximum BAC's are usually reached 20 to 30 minutes after consuming a single drink on an empty stomach. When drinks are consumed successively over time, the BAC rises with each drink, reaches a maximum 15 to 20 minutes following ingestion of the last drink and starts to decline from this maximum. (See illustration 3.) When several drinks are consumed in a very short period of time, peak BAC's may not appear until 45 minutes to 1¼ hours after ingestion of the last drink. (See illustration 4.)

5. Effects on the Central Nervous System. Alcohol is a depressant and not a stimulant. Many people think it is a stimulant since its first effect is to reduce tension and give a mild feeling of euphoria or well being. Of the various actions of alcohol, the most important are the effects on the brain. As the concentration of body alcohol rises, the higher functions, such as reason and judgment, are affected first; sensation and muscle coordination deteriorate next; and the more involuntary mechanisms are the last to be impaired. The effect of alcohol on the C.N.S. is always a depression, and never an improvement.

5a. Effects on vision - Pupils of the eye generally dilate (enlarge) and reaction to light becomes sluggish. At BAC's of 0.10% people are unable to completely fuse the vision of each eye into a single image. Glare is more bothersome and distance judgment is impaired. The time to adjust from far to near vision may be increased from 0.10 to 0.20 seconds at a BAC of 0.06%.

"Newman and Fletcher (N10) used tests of seven visual functions with 50 subjects whose blood alcohol levels ranged from 0.058 to 0.218%. With 46 of the subjects the blood alcohol was below 0.150%. At blood alcohols of 0.115% or above, all subjects showed depressed visual function in one or more of the tests. Some of the subjects were impaired at blood alcohol levels as low as 0.065%. The highest incidence of impairment was in visual acuity, with 70% of the subjects showing deterioration of this function after alcohol.

Goldberg (G9) tested the effects of alcohol on vision by means of a flicker fusion apparatus. The blood alcohol level at which impairment of vision began was for the three groups tested: occasional drinkers, 0.01-0.02%; moderate drinkers, 0.02-0.03%; and heavy drinkers, 0.04-0.07%. Goldberg stated (G10, p.90): 'Alcohol had the same effect on vision as the setting of a grey glass in front of the eyes, or driving with sun glasses in twilight or darkness; ...'

Bretcher et al. (B13) measured the effect of alcohol on binocular vision. They employed a device which caused momentary double vision without alcohol. With alcohol, the time required to attain single vision was about doubled at 0.10% blood alcohol and quadrupled at 0.15%. The authors said: 'Somewhere between 0.05 and 0.10%, all subjects showed definite impairment.'"

5b. Effects on reaction time and coordination - Alcohol causes an impairment in muscular coordination; the threshold of impairment has been demonstrated to be as low as a BAC of 0.02%. Reaction time is increased. Each person appears to have a threshold BAC at which impairment begins, then small additional doses of alcohol produce large losses in coordination. Motor tasks which require coordination or complex discrimination are impaired at BAC's of 0.05%.

6. Symptoms of alcoholic influence. Common symptoms of alcoholic influence are:

-Odor of alcoholic beverages on the breath
-Swaying or unsteadiness--staggering
-Poor muscle coordination
-Confusion
-Sleepiness
-Disorderly appearance
-Speech impairment, such as slurred, confused, thick tongue
-Dizziness
-Nausea
-Unusual actions, such as very talkative
-Visual disorders--fixed stare, glassy eyes
-Flushed skin

The list is not all-inclusive, nor does any one symptom or combination of symptoms mean that the person is intoxicated. Numerous illnesses/injuries can produce the same symptoms as alcoholic influence. Several of these are listed in Illustration 6. The officer should, therefore, examine and question the suspect carefully in order that a possible need for medical attention will not be ignored.

It might be pointed out that a chemical test can protect both law enforcement groups and the public by providing an alert to the need for medical attention. An unusually low BAC can serve to indicate that the subject's abnormal behavior is due to some illness or injury other than alcohol, and appropriate procedures can be undertaken to assure that the subject receives needed medical attention. An unusually high BAC also indicates the need for medical attention in order that the danger of respiratory or cardiac arrest can be avoided.

7. Alcohol combined with other drugs. Alcohol combined with other drugs can cause specific problems. As stated previously, medical care should be obtained for any individual who has a low BAC but appears to be markedly under the influence. The effects of alcohol combined with stimulants and depressants can cause serious problems to the individual. Even low levels of alcohol combined with certain drugs can in some cases be fatal.

Illustration 1

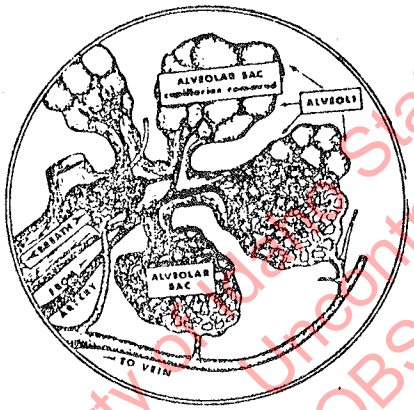
Alcohol in the human body

According to concentration in the brain, alcohol first impairs judgment, then causes muscular incoordination, stupor and finally unconsciousness.

Course of Alcohol

Mouth
↓
Esophagus
↓
Stomach
↓
Small Intestines
↓
Portal Vein
↓
Blood
↓

To all parts of the body where it is stored in the water until returned by the blood to the liver to be oxidized.

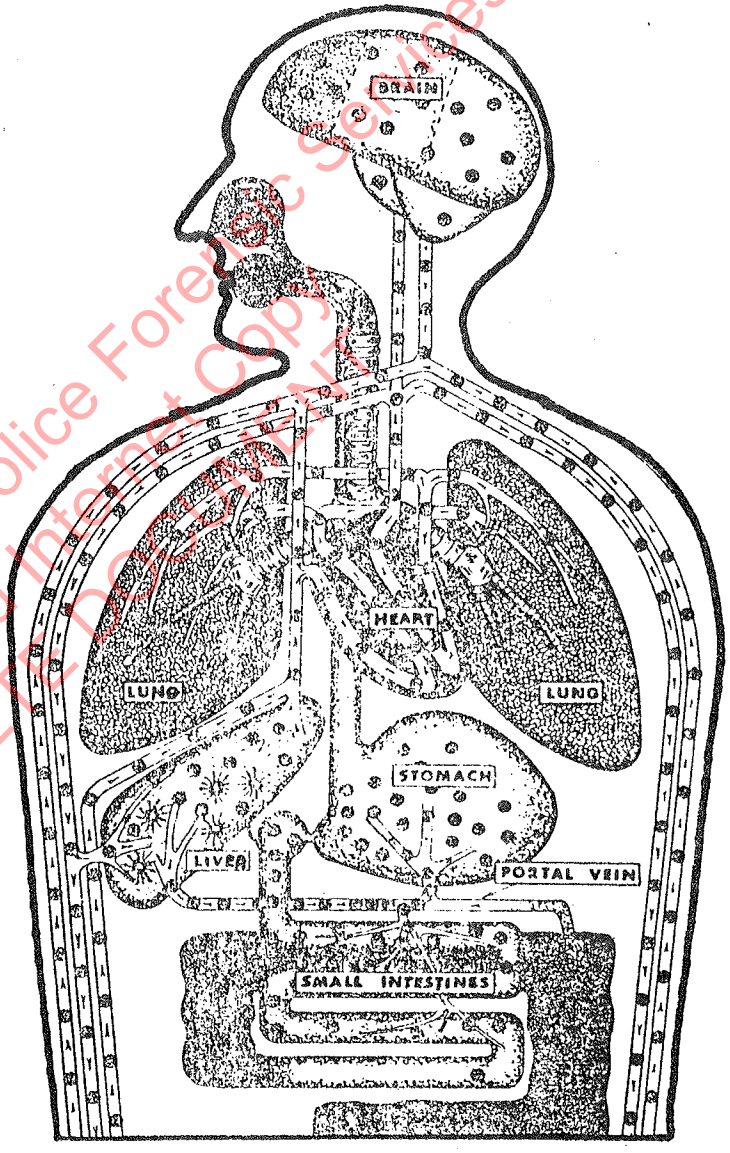


Primary Lobule of the Lung
diameter of circle= 1/50th inch

Blood vessels in the lungs end in networks of capillaries in the walls of the alveoli.

Alcohol from the blood is imparted to the alveolar breath.

Alveolar breath contains 1/2100th as much alcohol as the blood.



➢ Direction of Flow
⊙ Alcohol
✳ Alcohol being Oxidized

Illustration 2

Blood Alcohol Chart of Body Weight vs. Drinks Consumed

Showing estimated percent of alcohol in the blood by number of drinks in relation to body weight. This percent can be estimated by:

1. Count your drinks (1 drink equals 1 ounce of 100-proof liquor or one 12-ounce bottle of beer).

2. Use the chart below and under number of "drinks" and opposite "body weight" find the percent of blood alcohol listed.

3. Subtract from this number the percent of alcohol "burned up" during the time elapsed since your first drink. This figure is .015% per hour.

Example: 180 lb. man - 8 drinks in 4 hours

.167% minus (.015 x 4) = .10%

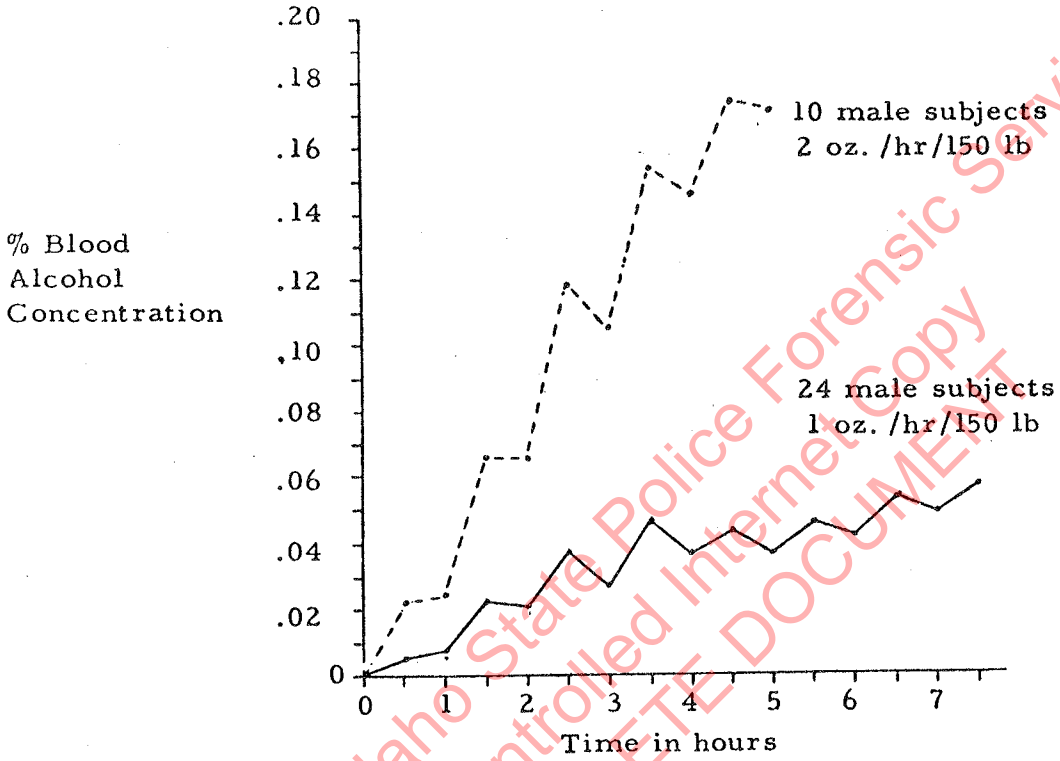
DRINKS

Body Weight	1	2	3	4	5	6	7	8	9	10	11	12
100 lb.	.038	.075	.113	.150	.188	.225	.263	.300	.338	.375	.413	.450
110 lb.	.034	.066	.103	.137	.172	.207	.241	.275	.309	.344	.379	.412
120 lb.	.031	.063	.094	.125	.156	.188	.219	.250	.281	.313	.344	.375
130 lb.	.029	.058	.087	.116	.145	.174	.203	.232	.261	.290	.320	.348
140 lb.	.027	.054	.080	.107	.134	.161	.188	.214	.241	.268	.295	.321
150 lb.	.025	.050	.075	.100	.125	.151	.176	.201	.226	.251	.276	.301
160 lb.	.023	.047	.070	.094	.117	.141	.164	.188	.211	.234	.258	.281
170 lb.	.022	.045	.066	.088	.110	.132	.155	.178	.200	.221	.244	.265
180 lb.	.021	.042	.063	.083	.104	.125	.146	.167	.188	.208	.229	.250
190 lb.	.020	.040	.059	.079	.099	.119	.138	.158	.179	.198	.217	.237
200 lb.	.019	.038	.056	.075	.094	.113	.131	.150	.169	.188	.206	.225
210 lb.	.018	.036	.053	.071	.090	.107	.125	.143	.161	.179	.197	.215
220 lb.	.017	.034	.051	.068	.085	.102	.119	.136	.153	.170	.188	.205
230 lb.	.016	.032	.049	.065	.081	.098	.115	.130	.147	.163	.180	.196
240 lb.	.016	.031	.047	.063	.078	.094	.109	.125	.141	.156	.172	.188

For clarification, if the 180 lb. person had all the alcohol from 12 ounces of 100 proof whiskey or 12 twelve-ounce bottles of beer in his body at one time, he would have a blood alcohol reading of 0.25% blood alcohol by weight.

Illustration 3

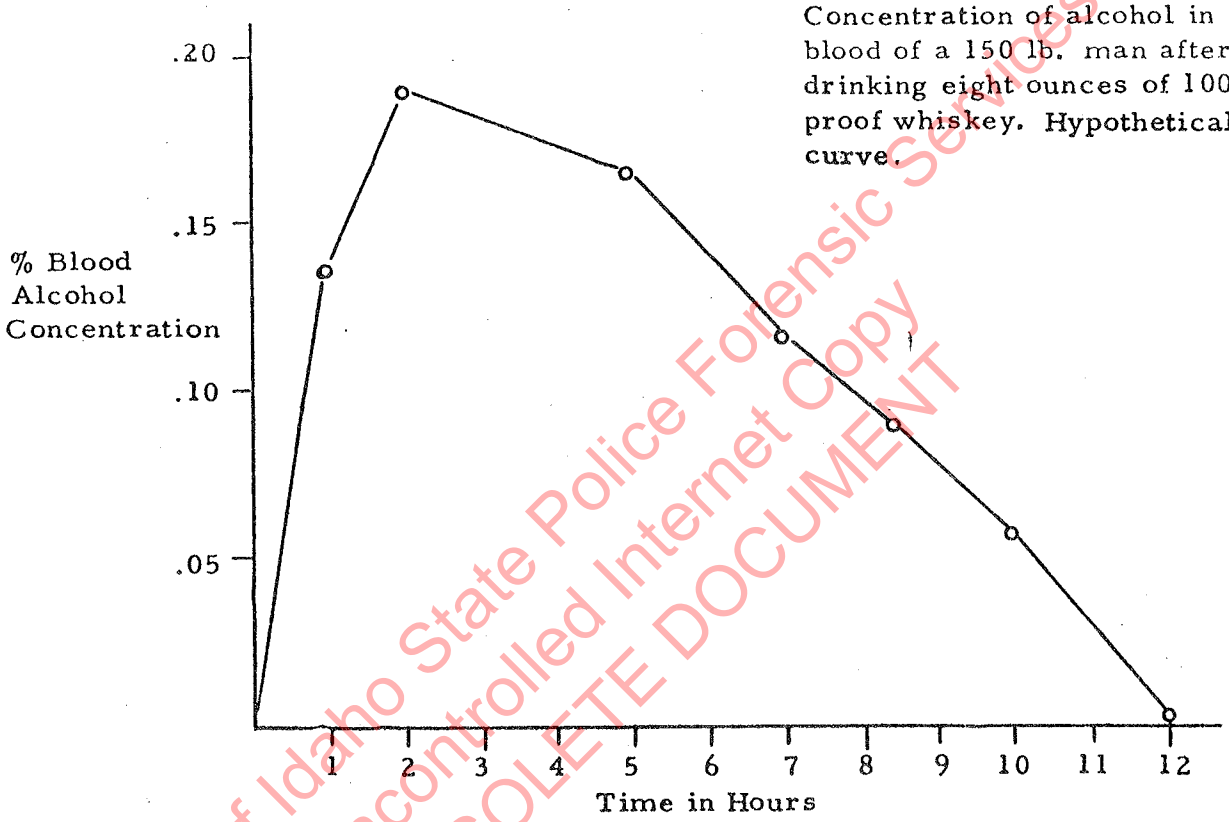
The BAC curve when drinks are consumed successively over time



Mean blood alcohol levels in male subjects consuming 1 or 2 ounces of 100-proof whiskey per hour per 150 pounds of body weight. First drink at time 0 with 1 drink each hour thereafter. Adapted from a figure in Forney, R. N. and Hughes, F. W. Combined effects of alcohol and other drugs. Springfield, Illinois: Charles C. Thomas, 1968, p. 16. (Originally printed in Clin. Pharmacol. Ther., 4:619, 621, 1963.)

Illustration 4

The BAC curve when several drinks are consumed in a short time period



Concentration of alcohol in the blood of a 150 lb. man after drinking eight ounces of 100 proof whiskey. Hypothetical curve.

Illustration 5

Stages of acute alcoholic influence/intoxication [1]

ETHYL ALCOHOL LEVEL, Per cent by Weight Blood (Urine)	STAGE OF ALCOHOLIC INFLUENCE	CLINICAL SIGNS/SYMPTOMS
0.01-0.05 (0.01-0.07)	Sobriety	No apparent influence Behavior nearly normal by ordinary observation Slight changes detectable by special tests
0.03-0.12 (0.04-0.16)	Euphoria	Mild euphoria, sociability, talkativeness Increased self-confidence; decreased inhibitions Diminution of attention, judgment, and control Loss of efficiency in finer performance tests
0.09-0.25 (0.12-0.34)	Excitement	Emotional instability; decreased inhibitions Loss of critical judgment Impairment of memory and comprehension Decreased sensitory response; increased reaction time Some muscular incoordination
0.18-0.30 (0.24-0.41)	Confusion	Disorientation, mental confusion; dizziness Exaggerated emotional states (fear, anger, grief, etc.) Disturbance of sensation (diplopia, etc.) and of perception of color, form, motion, dimensions Decreased pain sense Impaired balance; muscular incoordination; staggering gait, slurred speech
0.27-0.40 (0.37-0.54)	Stupor	Apathy; general inertia, approaching paralysis Markedly decreased response to stimuli Marked muscular incoordination; inability to stand or walk Vomiting; incontinence of urine and feces Impaired consciousness; sleep or stupor
0.35-0.50 (0.47-0.67)	Coma	Complete unconsciousness; coma; anesthesia Depressed or abolished reflexes Subnormal temperature Incontinence of urine and feces Embarrassment of circulation and respiration Possible death
0.45 + (0.60 +)	Death	Death from respiratory paralysis

[1] Prepared by: Kurt M. Dubowski, Ph. D., FAIC, Director, Department of Clinical Chemistry and Toxicology, University of Oklahoma, School of Medicine, Oklahoma City, Oklahoma, Member, Committee on Alcohol and Drugs, National Safety Council

Illustration 6

A List of Some Pathological Conditions Having Symptoms in Common with those of Alcoholic Influence*

Acetone Odor of the Breath (a fruity odor, which may be mistaken for the odor of alcoholic beverages):

- Concussion of brain
- Delirium tremens (form of acute insanity accompanied by trembling)
- Diabetes (disease of the pancreas (digestive gland) which prevents proper burning of blood sugar)
- Food poisoning
- Intestinal obstruction
- Severe migraine (headache)
- Starvation
- Stomach cancer
- Stomach ulcer
- Uremia (urine poisoning in the blood because of malfunctioning of the kidneys)
- Vomiting
- Wasting diseases such as cancer, malaria, syphilis, tuberculosis

Amnesia (loss of memory):

- Dementia (insanity which may be general paralytic, senile, or toxic)
- Epilepsy (the epileptic usually has no memory of the convulsion which may have led to an accident and his subsequent arrest)

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* Prepared by Doctor Herman A. Heise, Milwaukee, Wisconsin, one of the outstanding experts on chemical tests to determine alcoholic influence, who is a member of the American Medical Association and was formerly chairman of its Committee on Medicolegal Problems. He is also one of the charter members of the National Safety Council's Committee on Alcohol and Drugs, formerly the Committee on Tests for Intoxication. The designated symptoms are listed alphabetically, each followed by a group of pathological conditions which may cause the particular symptom. From Donigan, R.L. Chemical tests and the law. 2nd Ed. Evanston, Illinois: The Traffic Institute, Northwestern University, 1966, 300-307.

Instructions

Collection of Breath Alcohol Specimens

Using

Mobat Sober-Meter Model SM-7

Department of Health & Welfare
Bureau Of Laboratories
Forensic Section
2220 Old Penitentiary Road
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