California Association of Criminalists
NEWSLETTER

DECEMBER 1979

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SPRING SEMINAR ANNOUNCEMENT

The Spring Seminar will be held 8-10 May at the Santa Barbara Sheraton Hotel and Spa. Paper abstracts for this meeting are due 1 April. New CAC officers to be elected at this meeting include President Elect, Membership Secretary, Recording Secretary, and both Regional Directors. Further information on the meeting and the hotel are contained in this packet.

REGIONAL MEETING NOTES

Northern Section

The meeting, on November 30th, was at the Faculty Club on the University of California Berkeley campus. After dinner, John Thornton discussed the physical evidence related to the MacConald case.

Southern Section

The September meeting was hosted by the Los Angeles County Coroner's Forensic Laboratory. Mr. William Green of Jet Propulsion Laboratory, in Pasadena, was guest speaker. Mr. Green has worked extensively with image processing in the Mariner and Voyager Projects. His discussion included Computer Processing of Planetary Images and some forensic anecdotes.

The speaker at December's meeting was Senator Robert Presley, whose topic was "Legislation Impacting the Criminal Justice System." Senator Presley was active in the recent 1127 Bill. The California DOJ, Riverside, hosted this meeting.

STUDY GROUP ACTIVITIES

Northern Biology Group

The group met in November at U.C. Berkeley with George Sensabaugh as host. The subject matter was a review of papers given at the Eighth International Congress - Society for Forensic Haemogenetics, which was held Sept. 23 - Sept. 27. These papers are abstracted in Forensic Science International Vol. 14, No. 2 (1979). An updated study group bibliography was distributed as well.

Southern Serology Group

The September meeting, held at the Orange County Sheriff's Dept., was devoted to the biochemistry and electrophoresis of the polymorphic enzyme, Esterase D. Keith Inman, from the L.A. County Sheriff's Dept., led the discussion.

The November meeting was held at the Santa Ana Police Dept. Jim White, from the Orange County Sheriff's Dept., discussed the proceedings of the International Congress of the Society for Forensic Haemogenetics held in London in September. Abstracts are published in the Sept. - Oct. 1979 Forensic Science International. Keith Inman handed out blood samples for PGM and Esterase D typing.

Please notify Gary Sims at the L.A. County Sheriff's Dept. if you are interested in this study group.

Southern Arson/Explosives Study Group

At the September meeting, again at Orange County, gas study samples were distributed for analysis. These samples were taken from different stations and from the same stations at different time intervals.

In November, at Orange County, Wayne Plumtree discussed the manufacturing of gasoline.

Southern Drug Study Group

At the December meeting, discussion primarily dealt with topics to cover in future meetings. PCP was mentioned briefly. It was hosted by Duane Mausey, DOJ Santa Barbara.

Northern Firearms Study Group

The meeting in July was hosted by Contra Costa County. Dave Cumberland, proprietor of the Old West Gun Room in El Cerrito, discussed a number of subjects: (a) common malfunctions and operating problems of revolvers, pistols, and long arms; (b) the care and feeding of triggers; (c) cartridge interchangeability; (d) re-loading -- possible forensic aspects; and (e) gun safety.

ANNOUNCEMENT

The L.A. County Coroner's Dept. is offering a series of seminars from Nov. 28 - April 2. A variety of topics are being presented. For further information, please contact the L.A. County Coroner's office: phone (213) 226-8041.

EMPLOYMENT EXCHANGE

1. Position Open - North Carolina Bureau of Investigation

The N.C. Bureau of Investigation has an immediate opening for a Forensic Chemist in the trace evidence area specializing in fiber and textile examination. Salary commensurate with experience.

Application should be made to Mr. Ralph Keaton, 3320 Old Garner Rd., Raleigh, N.C., 27626; phone (919) 772-9550.

2. Position Open - Centre of Forensic Sciences, Toronto, Ontario

The Centre of Forensic Sciences, Ministry of the Solicitor General in Toronto seeks a highly experienced forensic scientist to fill the Section Head position in its Biology Section. The work involves directing a staff of seventeen scientists and technicians engaged primarily in forensic serology and hair and fiber examination. Qualifications required are a degree in an appropriate field of science preferably at the post graduate level and at least eight years of experience in forensic science at progressively increasing levels of responsibility.

For further information contact: Mr. D.M. Lucas, Director, Centre of Forensic Sciences, 25 Grosvenor St., Toronto, Ontario, M7A 2G8, Canada.

3. Positions Open - City of San Diego, California

The city of San Diego, Calif. crime lab has openings for one Assistant Criminalist and one Criminalist Journeyman. The latter requires a BS or BA and two years experience in criminalistics work in at least 3 of the following areas: (a) bloodstain analysis; (b) firearms identification; (c) crime scene processing; (d) narcotics analysis; (e) blood/alcohol analysis; (f) toxicology; and (g) trace evidence analysis.

For further information, contact: Employment Information Counter, City Administration Building Lobby, 202 "C" St., San Diego, California, 92101; phone (714) 236-5753.

4. Position Open - University of Illinois

Research Associate position open at University of Illinois. Two-year position, full-time, on federally funded study to determine the current utilization, costs, and benefits of forensic science in police investigations. Will work under direction of a principal investigator. Minimum requirements: Bachelor's degree. Prefer advanced degrees with education or training experience in criminal investigation with basic understanding of criminalistics procedures.

Send resume and writing sample to: Joseph L. Peterson, Director, Center for Research in Criminal Justice, University of Illinois at Chicago Circle, Box 4348, Chicago, Illinois, 60680.

5. Positions Open - Illinois Dept. of Law Enforcement

The Illinois Dept. of Law Enforcement is actively recruiting to fill twenty-five new Forensic Scientist positions in seven laboratories after July 1, 1980. For further information, please contact: Bureau of Scientific Services, Springfield Laboratory, 2168 South 9th St., Springfield, Illinois, 62703; phone (217) 782-4975. Contact Dan K. Webb, Director, or Michael S. Galco, Laboratory Supervisor.

6. Position Wanted - Mr. and Mrs. Callan

Mr. and Mrs. Callan are British subjects finishing a 2-year contract with the Royal Oman Police in the Sultanate of Oman. They wish to study and work in Criminalistics for the next two years. Mr. Callan wishes to obtain a degree in Criminology. He has some training in chemical engineering and criminology and for eight years was employed as a Scenes of Crime Officer with the London Metropolitan Police (which included their 6 month training course). His current assignment in Oman is as Detective Chief Inspector, which included setting up a crime laboratory. Mrs. Callan has a B.S. degree and a Master's degree and worked 4 years at the Metropolitan Police Forensic Science Lab. She is currently in Oman dealing with the scientific aspects in setting up a small forensic laboratory.

For further imformation, please write to them at 23 Porlock Dr., Luton, Bedfordshire, England.

7. Position Wanted - Anton Kristofic

Mr. Kristofic is a recent graduate in Forensic Science at John Jay College of Criminal Justice, N.Y. He has a B.S. degree and has had internships at Little Falls New Jersey State Police Lab and at the New York Police Dept. He is looking for a full-time position utilizing his skills and is willing to relocate.

For further information, please contact him at 540 - 52nd St., Brooklyn, N.Y., 11220; phone (212) 439-4717.

8. Position Wanted - Parveiz Aslam

Parveiz Aslam is finishing college with a major in a biological science and is interested in working and/or studying for a position in forensic science for the year 1980/81.

For further information, contact him at: Kingswood Hall, Coopers Hill Lane, Englefield Green, Egham, Surrey, England.

9. Position Wanted - Alan Young

Mr. Young is a recent graduate from Calif. State University, Sacramento, with a B.S. in Forensic Science and a minor in Chemistry.

He is seeking a position as a Crim. I or Crim. Trainee. Please contact him at: 1127 Santa Fe Way, Salinas, California, 93901; phone (408) 422-8587.

10. Position Wanted - M. Yunis Choudhry

M. Choudhry is a recent graduate from John Jay College of Criminal Justice, N.Y., with a Master's in Forensic Science. He has a B.S., M.S., and M. Phil. in Physics and is seeking a position as a Criminalist. for further information contact him at: 2260 University Ave., Bronx, New York 10468; phone home (212) 364-3846 or office (212) 295-1100 ext. 30,33.

A STUDY ON GREEN WINE BOTTLE GLASS

John Cockerham
Dept. of Justice
Sacramento, CA

A murder case involving a number of broken wine bottles evoked the question, "What can one say about wine bottle glass?" For a criminalist to admit that he couldn't say anything about something as common as wine bottle glass evoked this exploration into the subject of green glass. Although the evaluation of glass by means of its refractive index has a rather long and well documented history, there seems to have been little interest in green glass. Apparently the day-to-day concerns about broken windows and smashed automobile lamps was paramount. The Sacramento Regional Laboratory had at this time an instrument that seemed ideal for this problem— Finnigan's EDX. Refractive index seemed a primitive, tedious and demanding method when compared to the automatic, computer controlled analysis of this instrument.

Glass is a silicon-oxygen network. The addition of Li, Na, and K weakens this network and lowers the melting point of the product to the orange heat range (about 800° C). This temperature range was within the technology of earlier man. A glass with about 70% SiO_2 will be close to the lowest melting eutectic. Unfortunately, this glass has the property of being water soluble. This problem was solved by the addition of Ca, Ba, or Sr depending on which element is most available and cheapest. At most places calcium in the form of limestone was used. It was found that Mg, Al and B will affect both the melting point and working viscosity. These eleven elements form close to 99% of the expected total composition of container glass.

Contamination of the raw materials with iron (.5% or so) will give a yellow to green tint depending on the state of oxidation created by the heating method. To correct the iron color cobalt, manganese, or arsenic can be added to the glass. Chromium in small concentrations will cause an intense green color. Copper can also be used to give a green color, but the color is more difficult to control. Zinc is used in some glasses as a flux; it was at one time used as a substitute for lead. Tin and titanium are slightly soluble in the melt and are used to produce an opaque, milky glass. Gold and silver are used to produce red and yellow glasses. In short, the whole of inorganic chemistry and mineralogy can be found within the study and technology of glass. If the scope of the study is expanded to ceramic products, then the study envelops earth, fire and water. A study of clear glass products would be centered on the elements that have low x-ray fluorescent efficiencies, such as Na and Si, but a study of green glass could utilize the potential sensitivities of the EDX system for the 3 to 17 KEV range and such elements as Cr, Ni, Fe and Zn.

METHODS:

Approximately 200 green glass bottles were collected. The distribution of brand names (and the choice of many contributors) tended toward the cheaper bulk wine. Since this tends to parallel the type of bottles encountered in casework, no attempt was made initially to restrict the type of green bottle collected. The bottles were cataloged by a pencil rubbing of the base. This proved a fast, accurate way to preserve the information which had been molded into the bottle base at the time of its manufacture. The bottle was then broken by hammering the bottle in the side. A small fragment approximately one inch square was selected and preserved. The bottles were broken under running tap water. This reduced the flying glass. No additional attempts were made to clean the glass. The base of the bottle was stronger in most cases and tended to survive intact.

EDX:

The samples were placed in the sample carrier with no mylar film between sample and detector. Excitation was at 40 KEV, 1 MA, no filters, vacuum pathway. In anticipation of smaller samples, a 1 mm Molybdenum collimator was used throughout. The EDX was used in the standard Department of Justice energy to channel configuration. (Iron Kα at approximately channel 160.)

Counts were acquired until a 60 channel window of baseline had acquired 4×10^4 counts. Utilizing the program learn mode, the following information was acquired:

Element	Z	Baseline	Counted	Baseline
Time			0 X 1	
Total Counts			1 X 511	
Al	13	6 X 5	17 X 3	38 X 3
Si	14	6 X 5	72 X 6	35 X 3
K	19	62 X 5	68 X 6	96 X 5
Ca	20	62 X 5	78 X 8	96 X 5
Rb	37	330 X 5	362 X 4	368 X 5
Sr	38	375 X 5	383 X 7	395 X 5
Pb	82	320 X 5	340 X 4	373 X 5
Ni	28	137 X 5	190 X 5	197 X 5
Cr	24	112 X 5	129 X 7	167 X 5
Fe	26	137 X 5	157 X 8	167 X 5
Cu	29	196 X 5	207 X 3	219 X 3
Zn	30	213 X 5	225 X 3	263 X 5
Ar	33	263 X 5	280 X 3	330 X 5
Zr	40	415 X 5	430 X 7	493 X 5

Refractive index was measured utilizing a 589Å (Sodium D Line) interference filter to obtain monochromatic light, the Mettler FP52 hot stage for the measurement of temperature, DC-710 silicone oil as the immersion media, and a Swift Phase Master for observation.

DISCUSSION:

EDX is useful in distinguishing green glass containers by manufacturer, by type of glass and, in some instances, by location of plant. However, questions of homogeneity are related to the manufacturer. For example, the Gallo Winery produces the glass bottles into which its wine is ultimately marketed. The bottle-to-bottle homogeneity is approximately the same as fragments from the same bottle. This may reflect the company's interest in quality control or the consistency of its raw materials and methods. The company policy is that only Gallo wine goes into Gallo bottles. (TABLE 1)

Owen Illinois, in contrast, makes and sells glass containers and has a much wider range of composition. This may be explained by many glass plants located across the Country. Their use of zirconium oxide refractories in their melting vats is most likely related to the higher zirconium concentrations in some bottles bearing their mark. (TABLE 2)

The rich variety of elements found in bottles of foreign manufacture tends to distinguish them from domestic products. This could be related to different governmental and environmental restraints or their choice of raw materials. (TABLE 3)

The central concern with the EDX analysis was the poor precision of the technique as used. The number of counts for an approximately fifteen minute acquire program was, at best, meaningful to the second place number. The selection of program represents an attempt to obtain the maximum amount of information in a way that could be expanded to other types of glass. An informal objective was a general program that could be universally used for the collection and comparison of large numbers of glass samples.

Perhaps the most meaningful aspect of information gathering with a computer program is found between the data found in Table #1 and Table #1A. The rather gross differences found in the separate determinations are related to several repairs of the instrument which took place in the time interval between runs. This means that either the program must be readjusted to the proper acquire windows or the instrument must be tediously recalibrated. For day-to-day work it is much easier to adjust the program. Unfortunately, this invalidates any comparison with previously acquired data.

The technique of acquiring counts for a predetermined time did not appear to be the best method. This method would require that the sample size be similar. Samples that were approximately one square inch were giving poor precision, and small samples would tend to get lost in the background noise. Comparison of small samples with larger samples would be suspect with this technique.

The alternate method of acquiring for a predetermined count would tend to ratio the individual counts and permit a direct comparison of samples with differing sizes. Chromium's Ka window was first selected because it was found in most green glass. This procedure distorted the entire spectra depending on the chromium content. A glass sample with no chromium would acquire until the background reached the predetermined count. A glass with a high chromium response would stop with a much reduced overall picture. Although this technique was useful for the comparison of two samples, the distortion complicated attempts to systematize fifty or more samples.

TABLE #1

GALLO BOTTLE #81

CONSECUTIVE RUNS

	Time	Al	Si	K	Ca	Sr	Fe	Cr	Zr	Match Point Ref. Index °C
	1151	1717	95004	8143	87424	4522	8146	4190	2429	
	1137	1772	93561	7771	85803	4522	8000	4113	2332	59.1°
	1157	1741	94975	8047	88283	4659	8163	3906	2557	
Mean	1148	1743	94513	7987	87170	4567	8103	4069	2439	
Std Dev.	10	27	825	193	1259	79	89	146	112	

THREE SAMPLES FROM GALLO BOTTLE #101

Time	Al	Si	K	Ca	Sr	Fe	Cr	Zr	Match Point Ref. Index °C
1131	1728	90389	7747	82983	3497	7834	3339	2515	
1160	1861	90893	7584	82802	3615	7878	3463	2137	59.5°
1128	1809	90314	7804	82824	3696	7768	3535	1948	

SAMPLE FROM THREE GALLO BOTTLES #78, #80, #85
(Average of two runs)

Time	Al	Si	K	Ca	Sr	Fe	Cr	Zr	Match Point Ref. Index °C
1190	1908	93347	8100	88240	4754	9035	3306	3456	59.1°
1155	1754	93881	8025	83980	3953	8479	4202	2603	59.3°
1170	1890	95073	8256	88628	4730	8179	4093	2320	58.9°

TABLE #1A

GALLO BOTTLE #81

CONSECUTIVE RUNS
Counts Acquired to 1000 Sec.

Time	Al	Si	K	Ca	Sr	Fe	Cr	Zr
1000	1175	18195	21033	75176	2262	7190	3088	1731
1000	1072	18305	21552	74597	2299	7352	3138	1436
1000	1303	17965	21346	74921	2583	7217	3354	1280

TABLE #1B

Sample crushed, mylar film and short indium culminator used to count sample for 10^3 sec. bottle #24, finer than 400 mesh.

									As
1000	2110	11582	14356	288297	9019	82123	15634	7910	1154
1000	2058	10923	13801	286936	8284	81543	15333	7748	792

TABLE 2

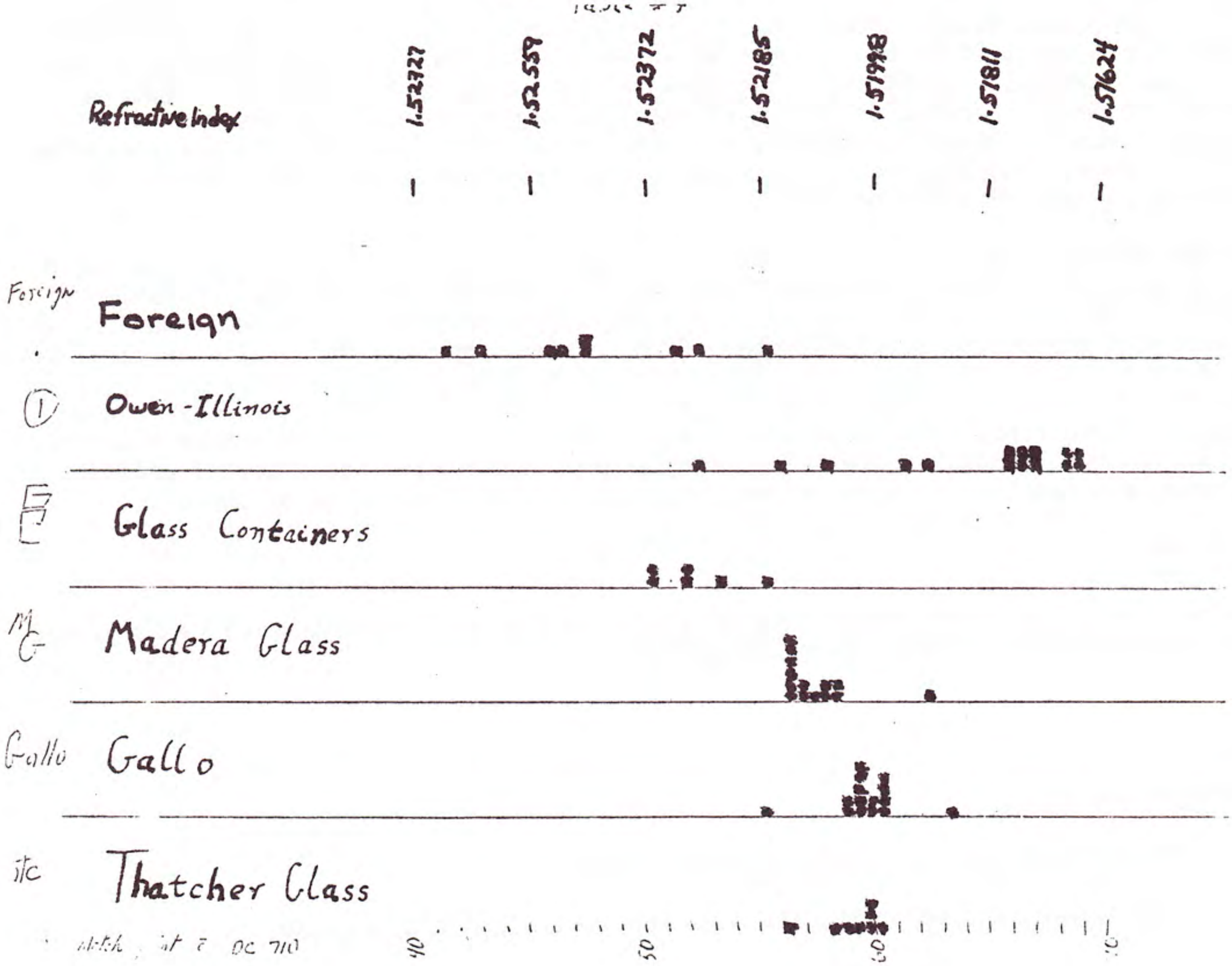
EDX comparison by glass manufacturer and selected elements (counts x 10^3)

Symbol	Manufacturer	Al	K	Ca	Sr	Fe	Cr	Zr	Other
	Owen-Illinois	1–2	1–5	83–103	1–6	10–18	2–5.7	2.1–6.4	Ni
	Glass Containers	1–2	5–14	91–116	2–4	10–14	2–4	.9–1.6	Ni
	Madera Glass	1.7–2	9.6–11	81–90	2–3	11–13	3–4	1.4–2.1	
	Gallo	1.3–1.9	7–13	79–90	3–5	7–11	3–4	1.5–2.6	
	Thatcher Glass	1.6–1.8	9–11	80–86	3–4	7–10	3–4	2.7–3.4	

TABLE 3
EDX OF FOREIGN BOTTLES
(In counts X 10^3)

	K	Ca	Fe	As	Pb	Ni	Cr	Cu	Zr	Zn
Italian	10	82	20	–	–	–	–	–	4	–
Italian	8	98	14	–	–	–	4	–	3	–
Italian	7	82	50	–	–	–	3	–	3	–
Italian	8	70	24	2	2	–	4	–	4	–
French	6	99	16	–	–	3	2	–	3	–
Chile	8	83	31	–	–	–	3	2	4	–
Italian	9	79	16	–	–	–	2	–	3	–
German	4	85	20	1	1	–	4	–	5	–
Spain	8	98	16	1	1	1	3	–	3	–
Portugal	7	81	43	–	–	–	3	–	3	2

TABLE 4



The present program used a predetermined count in a window that normally contains only background. Glass containing elements fluorescing in this energy range were exceptional. Since the acquire time is rather constant (about 1,000 sec.), the data can be generally compared without a difficult conversion to counts/seconds.

The counts per second can be used to translate the data into a common chemical language such as percent composition. Although this would have obvious advantages, it would also require the use of glass samples of known and varied composition. The addition of known amounts of oxides to powdered glass with subsequent remelting was tried. The resultant speckled glass appeared to have serious mixing problems. The preparation of a lower melting lithium-borate glass with known amounts of various oxides seems, on preliminary tests, to be a useful method. This might ultimately allow the compilation of meaningful data independent of instrumental drift.

The minimum size for a sample was ultimately limited by the signal to noise ratio and the minimum amount of information that could be used. If the minimum information was the presence or absence of iron, lead, or copper, then the counts in a specific window have only to be about twice the variation of the spectral background. For the general program, the minimum sample size was about .25 inches in diameter. Below this size some information slid below the noise level. Every effort was made to reduce the noise level. Metal foil filters did not help. Filters just shifted the counts from one part of the spectra to another. Reducing the beam diameter of the exciting x-ray to approximately the size of the sample by means of an indium mask seemed to help. Careful selection of baseline and restriction of the size of the counting windows helped. However, the final observation was that the present x-ray fluorescence technology could not match the minimum sample size requirements of present refractive index methods.

It was thought that in cases where the refractive index was similar, the EDX could be of potential forensic use when large glass fragments were present. A review of Table #4 will suggest that the glass of some manufacturers such as Gallo and Thatcher Glass will group into similar ranges of refractive indices. These glasses also group into rather similar EDX spectra. A careful selection of glass samples could, of course, force the conclusion that EDX could differentiate where refractive index could not; however, this situation is expected to be the exception rather than the rule. In conclusion, if precision, sample size, usefulness, simplicity, and data storage are considered, then refractive index remains the method of choice.

SUMMARY:

Refractive index, when compared to EDX, remains the most sensitive and rapid method for evaluating microscopic glass fragments.

REFERENCES:

Mitchell, B.J., Anal. Chem. 33, 917 (1961)

Ojena, S.M. and DeForest, P.R., J. For. Sci., 14, 3, 409 (1969)

COLORING CASTING MATERIALS AS AN ALTERNATIVE TO SMOKING OR DUSTING CASTS

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Jelcone brand silicone rubber casting material has been in use for a number of years for casting toolmark impressions. Generally, in order to enhance the striae, smoking the cast with Magnesium oxide is necessary. An alternative for enhancing the striae is to make the original casting material less translucent which increases the contrast of the peaks and valleys of the mark under oblique lighting, without reducing the detail of the cast itself.

Making Jelcone gray seems to accomplish this purpose satisfactorily. The original technique I tried for making Jelcone gray was adding fingerprint powder to the catalyst, then mixing this into the pink silicone material. This technique works fairly well, but the fingerprint powder seems to be a little too grainy. An alternative and superior blackening agent was found to be a black coloring agent from Ferro Corporation, located in Los Angeles, California. Again, the coloring agent is added to the catalyst. The best way I have found is to put one tube of catalyst into a 30 cc disposable syringe, and add the black coloring agent to the catalyst and mix well. The casting process itself requires about 1½ times the normal amount of catalyst to give a satisfactory hardening time and consistency to the cast.

I felt that a similar result could be obtained by altering the color of Duroc brand dental casting material. This yellow-colored casting material is often used for casting shoe and tire impressions. I again tried fingerprint powder first but this was unsatisfactory as it seriously weakened the casting material. I next tried a blackening agent specifically meant for pigmenting concrete and mortar. A one-pound box of this material, Dowman's No. 10 black cement and mortar color, satisfactorily colors 25 pounds of Duroc. The best way to mix these materials is to take the dry powders and mix them together by tumbling. You then make the Duroc up as you would normally. I mix the powders by tumbling them in a sealed five gallon can. I can easily make up 25-pound batches in this manner.

The use of black casting material circumvents the necessity for dusting the yellow casts with fingerprint powder in order to enhance the lighting and visibility characteristics of the cast. I tried this with several different shades of gray for the Duroc and under normal lighting conditions they appear to be superior with respect to contrast to the yellow Duroc. Achieving proper lighting also seems to be easier than it does with the yellow casting material.

Formulas:

Gray Jelcone - .15 grams Ferro, F.O. 2708-8 Blk - black color to one tube of Jelcone catalyst. Add 1½ times the normal amount of catalyst to the pink silicone material. Mix until an even gray color is achieved.

Gray Duroc - One pound Dowman's No. 10 Black cement and mortar color. Add it to 25 pounds Duroc casting material. Mix as dry powders by tumbling, then make cast as normal.

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