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HAROLD I. ZELIGER, Ph.D.

EDUCATION

B.A., Chemistry, Yeshiva College, 1962.

M.S., Physical Chemistry, Union college, 1966

Ph.D., Organic Chemistry, Midwest Institute for Advanced Studies, 1974

SUMMARY

Areas of expertise include occupational and environmental exposure to toxic chemicals, hazard communication (labeling, material safety data sheets and employee education programs) chemical formulating and processing, environmental impact and toxic wastes.

MEMBERSHIPS

Certified Professional Chemist.

Board Certified Forensic Examiner.

E.P.A. and New York State Certified Laboratory Director.

Member, Association of Consulting Chemists and Chemical Engineers.

Fellow, The American Institute of Chemists.

Member, American Chemical Society.

Member, American Board of Forensic Examiners.

Listed in Who's Who In Science & Technology.

Author of Over 40 Technical Publications, Including Book Chapters and Patents.

CAREER HISTORY

CHEMICAL, ENVIRONMENTAL & TOXICOLOGICAL CONSULTANT - Management, laboratory and field services for industry and government. Product and process design and evaluation; handling, disposal and environmental impact of toxic and flammable substances; occupational and environmental exposure to toxic chemicals; labeling and hazard communication; liaison with regulatory agencies; expert testimony for litigation of chemical, environmental, toxicological and product liability matters, and compliance with work place safety, labeling and right-to-know regulations.

NORTHEAST RESOURCE CENTER, INC., West Charlton, NY - President, with responsibilities for technical, marketing, financial and administrative affairs of a company engaged in the manufacture and sales of chemical products (adhesives, coatings, cleaning compounds, cosmetics, solvents, pesticides, catalysts, and other specialty chemicals) and in contract R & D, product development, comparative product studies, marketing, business analyses and projections.

FORCON INTERNATIONAL

ADAM CHEMICAL COMPANY, INC., West Charlton, NY - President with overall responsibility for a company engaged in the manufacture and sales of adhesives, varnishes, supports and systems used in the restoration of fine art. Products are marketed to the world's museums and art conservators.

SARAH LAWRENCE COLLEGE, Bronxville, NY - Professor of chemistry and environmental science, chairman of the division of man, His Natural & Social Environment, director of special programs.

AVCO SPACE SYSTEMS, Lowell, MA - Senior Scientist and project director. Responsible for marketing, administration and implementation of government contracts for -materials composition projects aimed at space and military applications.

GENERAL ELECTRIC R & D CENTER, Schenectady, NY - Electrochemical research and product development directed at applications in fuel cells and batteries.

LITIGATION - TOXIC TORTS: EXPOSURE AND FAILURE TO WARN (LABELING AND HAZARD COMMUNICATION)

- Liver and kidney cancer following long term exposure to methylene chloride. Six cases involving labeling and exposure questions.
- Respiratory and other illnesses following a large pesticide plant air discharge.
- Anesthesia and drowning following paint solvent inhalation in an automobile body painting facility.
- Teratogenic effects of adhesive solvents.
- Ground and drinking water pollution by industrial solvents and their decomposition products in a major U.S. city.
- Respiratory and neurological illness following long term exposure to perchloroethylene.
- Liver and kidney disorders following long term exposure to gasoline fumes seeping into a house from leaking underground storage tanks.
- Respiratory problems after inhalation of particulates in a glass manufacturing plant.
- Improper labeling and hazard communication leading to respiratory injury following long term exposure to acrylic compounds emanating from ultra violet cured printing inks.
- Acute esophageal injury from ingestion of alkaline material.
- Decomposition products from pyrolyzed edible oils.
- Improper labeling leading to injury from acute exposure to 1,1,1-trichloroethane.
- Asphyxiation from inhalation of argon during the relining of a steel producing vessel
- Improper labeling leading to asphyxiation from inhalation of methylene chloride.
- Hair loss after use of hair treatment chemicals.
- Improper labeling leading to nervous system injury after inhalation of household pesticide product.
- Respiratory problems following inhalation of air containing chlorofluorocarbons leaking from a refrigerator.

FORCON INTERNATIONAL

- Sarcoma following long term exposure to ethylene oxide.
- Injury following hair wash with consumer shampoo product.
- Blindness resulting from sodium hydroxide entering an eye.
- Death resulting from nitrogen dioxide exposure following entry into an oxygen limiting silo.
- Liver cirrhosis following exposure to methylene chloride in an improperly labeled paint remover product.
- Central nervous system abnormality following exposure to fumes from an electrical transformer pole fire.
- Asthma sustained following stainless steel welding. Exposure and labeling considerations.
- Pancreatic cancer following exposure to trichloroethylene.
- Death following the mixing of acid and chlorine/alkali cleaners. Exposure and labeling case.
- Reactive Airways Dysfunction Syndrome (RADS) asthma following a single exposure to chlorosilanes.
- Severe burn injury following skin contact with concrete. A failure to warn case.
- Asphyxiation by argon inhalation while welding in a confined space.
- Loss of senses of taste and smell following acute exposure to a degreaser containing citrus oil and mineral spirits. A failure to warn case.
- Occupational asthma following exposure to isocyanates in a foundry.
- Asthma and neurological impairment following a single high level exposure to pesticides in grain.
- An exposure and failure to warn case.
- Skin lesions and hair loss following exposure to “ooze” surfacing at a housing site built on top of a toxic waste dump.
- Severe chemical burns following immersion in boiler additives.
- PCB contamination of two lakes following discharge from pumping stations.
- Respiratory injury following inhalation of welding and adhesive fumes. An exposure and failure to warn case.
- Leukemia following long term exposure to paint booth sludge fumes.
- Occupational asthma following exposure to printing inks and hydrocarbon solvents. An exposure and failure to warn case.
- Onset of asthma, sinusitis and allergic reactions following a one time use of a garden pesticide. A consumer product labeling case.
- Onset of aplastic anemia following chronic exposure to a product containing benzene. A failure to warn case.
- Anaphylactic shock following intimate contact with a latex rubber medical device.
- Central nervous system injury following exposure to paint mists containing heavy metals.
- Respiratory and central nervous system injury following exposure to a hydrazine spill.
- Respiratory injury following inhalation of fumes while welding boilers containing petroleum residues.
- Death from kidney cancer following 20 years of exposure to amines, chlorinated hydrocarbons and other chemicals in a chemical manufacturing plant.
- Respiratory and central nervous system injury following exposure to carbon monoxide.
- Respiratory injury following exposure to formaldehyde.
- Skin injury following application of a cosmetic product.

FORCON INTERNATIONAL

- Kidney cancer following long term exposure to newspaper printing ink.
- Respiratory injury following exposure to a floor tile cleaner containing butoxyethanol.
- Respiratory and central nervous system injury following exposure to solder, flux and cleaning solvents.
- Respiratory injury following exposure to welding fumes in an oil fired electrical power plant.
- Development of Parkinson's symptoms following occupational exposure to manganese.
- Respiratory and skin injuries following exposure to electrolytic cutting oil fumes.
- Skin injury following prolonged exposure to commercial paint products.
- Skin injury from exposure to hydrogen peroxide leaking from a consumer drain cleaning product.
- Central nervous system injury following acute exposure to tetrahydrofuran.
- Respiratory injury following exposure to hydrocarbon fumes emanating from a rail road yard degreasing tank.
- Respiratory injury from inhalation of polyurethane paint fumes.
- Respiratory injury following exposure to volatiles from newly installed carpeting.
- Central nervous system injury following exposure to 1,1,1-trichloroethane and perchloroethene.
- Onset of asthma following exposure to diesel fumes and paint vapors.
- Respiratory injury from inhalation of hair spray fumes.
- Mouth and digestive system injury from ingestion of sanitizing solution.

LITIGATION - FIRE & EXPLOSION - CAUSATION AND FAILURE TO WARN

- House fire and personal injury resulting from ignition of highly flammable solvent fumes released by a flooring tile adhesive.
- House fire following the application of a wall panel adhesive containing flammable solvents.
- House fire and personal injury following the application of a flammable floor tile adhesive.
- Injury and death following the explosion of a peroxide storage tank in a plastics manufacturing plant.
- Identification of the cause of a fire in a polymerization vessel.
- Explosion of a drum containing residual naphtha following the attempted removal of the top with a welding torch.
- Explosion and fire following the addition of solvent to a barbecue.
- Burns following ignition of clothing fabric in a laboratory fire.
- Spread and decomposition of PCB's in a utility pole fire.
- Failure of breathing apparatus support straps in a building fire resulting in injury to a fireman.
- Apparatus contamination following decomposition of PCB's in a building fire.
- Explosion and fire following the attempted cutting of a drum containing residual lubricating oil with a welding torch.
- Explosion following the attempted cutting of the top of a drum containing residual fumes of an extremely flammable ink lacquer solvent mixture with a welding torch.

FORCON

INTERNATIONAL

- Injury and property damage from a fire following the accidental addition of gasoline to a kerosene fueled space heater.
- Explosion and injury following the inflation of a tire with a tire inflator product and pure oxygen.
- Explosion and fire from aerosol paint fume migration to an ignition source.
- Injury from a fire following the addition of fuel to a hot camp stove.
- Injury from a flash fire resulting from the addition of gasoline to diesel fuel in a truck.
- Injury from an explosion following the attempted cutting of the top of a drum containing road marking paint residue with a welding torch.
- Injury from an explosion following the attempted welding of a tire rim containing a tire that had been filled with a flammable medium.
- Injury from the explosion of an aerosol paint can.
- Injury from the ignition and rapid combustion of a shirt.
- Spontaneous combustion of trash containing wood treatment residues. (Three cases).
- Injury and death from the spontaneous combustion of rags used with a wood treatment product.
- Fire associated with storage of various oils in a confined area.
- Fire and personal injury from combustion of eucalyptus oil.
- Fire and personal injury from ignition of a cleaning solution containing mineral spirits used to degrease heavy equipment.
- Fire in an office storage closet containing oily rags.
- Personal injury following the explosion of a tire containing a tire inflator product.
- Personal injury from the spill of engine coolant following an automobile crash.
- Fire from spontaneous combustion following the wetting of a swimming pool chlorine product.
- Fire and explosion from electrostatic discharge caused by pouring powder.
- Fire from spontaneous combustion after wetting of swimming pool chlorine chemicals.

LITIGATION - CHEMICAL PRODUCT AND PROCESS CASES

- Death and injury following explosion of a reactor vessel in a plastics manufacturing plant.
- Pollution of ground water and stream from discharge of chromium by a beverage can manufacturing facility.
- Hydrogen sulfide release from a land fill.
- Animal feed decay after storage in an oxygen limiting silo.
- Injury and property damage following ignition of flammable solvents in adhesive products - four cases. Labeling and effective hazard communication at issue as well.
- PCB pollution of the Hudson River.
- Building collapses following construction with inappropriate adhesives.
- Furniture failure following assembly with inappropriate adhesive.
- Improper label on an aluminum extension pole contributing to an electrocution.
- Industrial chemical classification of a commercial chemical product.

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- Paint analysis to demonstrate tampering with an injection molding apparatus design.
- Analysis of a fire damaged nylon reactor vessel and recommendation of a salvaging procedure.
- Cyanoacrylate adhesive failure in manufactured products instruments.
- Adhesive failure in manufactured heating and air conditioning vents.
- Injury following the failure of a floor tile adhesive.
- Household odor resulting from construction on filled land.
- Improper label on a drum of flammable solvent leading to explosion and injury.
- Contamination of candy by oxidized wax.
- Explosion following the addition of solvent to an ignited charcoal bar-b-que.
- Delamination of printing from mirror surfaces following exposure to water.
- Patent infringement litigation involving an adhesive used in a rodent trap.
- Suitability of a 100% solids epoxy coating for concrete immersed in synthetic sea water.
- Peeling of paint in a synthetic sea water aquarium.
- Contamination of bottled mineral water following packaging.
- Failure of bumper paint in an automotive application.
- Failure of a wall paper adhesive to be stripable following application.
- Permeation of an organic liquid through a polyurethane envelope in a medical device.
- Failure of paint on synthetic running boards of converted vans.
- Failure of paint on wall and ceiling surfaces of a rum manufacturing facility.

LITIGATION - ENVIRONMENTAL CASES

- Tracing the source of trichloroethylene contamination of soil and ground water at an industrial development site.
- Tracking the sources of toxic chemical contamination of soil, private wells and the municipal water supply of a Midwestern city.
- Determination of the source of an offensive odor in a newly constructed home.
- Underground transport of gasoline through soil and ground water following release from an underground storage tank.
- Contamination of an aquifer by chlorinated and aromatic hydrocarbon solvents and their decomposition products.
- PCB contamination of lakes from gas pipeline pumping station discharges.
- Transport of gasoline by floating on top of a shallow aquifer following long term leakage from underground storage tanks.
- Release of trichloroethylene from a coffee decaffeinating process.
- Release of lead from an indoor firearms range with resulting soil and water contamination.
- Airborne transport of heavy metals emanating from a recycling and incineration facility.
- Contamination of an aquifer by discharge of trichloroethylene, methylene chloride, toluene, xylene and several other toxins.
- Soil contamination and subsequent incidences of cancer following the derailment of a train

FORCON INTERNATIONAL

- containing agent orange.
- Electromagnetic radiation from a Cellular Telephone transmission tower.
- Transport and decomposition of chlorinated hydrocarbons in soil and ground water following discharge from an industrial degreasing operation.
- Respiratory sensitization from environmental exposure following the installation of new carpeting.
- Ground water and stream contamination by Mirex, other pesticides and various solvents from pesticide manufacturing discharge.
- Ground water contamination by trichloroethylene from a frozen food processing plant.
- Respiratory and other health effects from exposure to formaldehyde released from particle board.
- Air, water and soil contamination by emission of lead from a battery recycling operation.
- Ground contamination by pentachlorophenol from a wood preservation processing facility.
- Personal injuries from environmental exposure to waste oil and solvents in a bauxite mine.
- Soil contamination by lead and antimony from a lead smelting operation.
- Allocation of responsibility for chlorinated ground water contamination resulting from multiple industrial sources.
- Soil, surface water and ground water contamination by discharge and run off from the pressure treatment of utility poles, railroad ties and lumber with creosote, pentachlorophenol and chromated copper arsenate.
- Contamination of a high rise office building with dioxins and furans following a PCB containing transformer fire.
- Environmental impact of discharge of contaminated process cooling water from a wire coating operation.
- Soil and ground water contamination from a steel drum recycling operation.
- Soil and ground water contamination from a herbicide packaging operation.

CHEMICAL PROJECTS

- Process design for the manufacture of citric acid.
- Invention of a process for milling Teflon.
- Elucidation of the causes of deterioration of canvas backed oil paintings.
- Process design for recovery of precious metals from electrorefining of copper.
- Development and EPA registration of pesticides for roaches.
- Development of synthetic "skin" for a cardiac simulator.
- Development and manufacture of additive for nail polish.
- Specification of a flue gas desulfurization system for a coal fired electrical generating station.
- Formulation and manufacture of a water based low toxicity degreaser for industrial use.
- Formulation, EPA registration and manufacture of a fly repellent for horses.
- Development of a treatment for bronze disease in archaeological bronzes.
- Development of a chemiluminescent lighting source for wrist watches.
- Development and EPA registration of Smilicides for air conditioner applications.

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- Invention of a solution process for production of high surface area platinum catalysts.
- Development of additive formulations for prevention of odor fade in mercaptan odorized natural and LPG gas.
- Development of very high surface area platinized electrocatalysts.
- Development of chemical badges for detection of airborne toxic chemicals.

ENVIRONMENTAL PROJECTS

- Determination of the sources of toxic chemical pollution of the drinking water of a Midwestern city.
- Determination of the source of trichloroethylene found in the soil of a suburban manufacturing facility.
- Tracing the flow of PCB's in the Hudson River.
- Development of an encapsulation plan for containing heavy metals in a land fill.
- Recycling of industrial waste water by removal of heavy metals and organic solvent contaminants
- Environmental impact analysis of air and water discharges from an aluminum can manufacturing plant.
- Land use evaluation for a municipality planning zoning law changes.
- Evaluation of the environmental impact of the proposed discharge of solvent vapors into the air of a suburban community.
- Specification of air pollution equipment for a copper recycling plant.
- Source identification and removal of a pervasive odor in a suburban water supply system.
- Comparison of pollution from different types of electrical power generation systems.
- Presentation of a seminar on air pollution - source sampling and analysis.
- Recycling of water following neutralization of acidic industrial waste water.
- Evaluation of the total air emissions of a pharmaceutical manufacturing plant.
- EPA registration of pesticide products.
- Preparation of regulatory compliance applications for air and water emissions from a chemical manufacturing plant.
- Contamination of ground water by chlorinated and aromatic hydrocarbon solvents and their decomposition products.
- Removal of sulfides from well water.
- Specification of a fly ash system for a flue gas desulfurization installation.
- PCB contamination of lakes from gas pipeline pumping station discharges.
- Release of trichloroethylene from a coffee decaffeinating process.
- Evaluation of a filtration process for removing volatile organic chemicals from waste water.
- Identification of source of 1,1,2-trichloroethane that infiltrated ground water.
- Identification and allocation of sources of trichloroethylene contaminating ground water in an industrial park setting.

ADHESIVES PROJECTS

- Formulation, manufacture and marketing of hot melt adhesives for art restoration and conservation.
- Formulation and production of synthetic wall covering adhesives.
- Process design for the manufacture of prepasted wall coverings.
- Formulation of reduced flammability solvent based tile adhesives.
- Formulation and manufacture of water based packaging adhesives.
- Formulation of water based floor and wall ceramic tile adhesives.
- Formulation and manufacture of hot melt packaging adhesives.
- Formulation and manufacture of pressure sensitive hot melt label adhesives.
- Formulation of polyurethane adhesives for laminating aluminum and steel to polystyrene and polyurethane foam.
- Formulation of single component epoxy adhesives for encapsulation of wire.
- Formulation of solvent based pressure sensitive adhesives for adhering tape to synthetic skin.
- Formulation of water based fire retardant adhesives.
- Formulation of water based pressure sensitive adhesives for laminating aluminum and steel to glass.
- Formulation of glass to wood laminating adhesives.
- Formulation and converting of EVA heat seal adhesive film.
- Formulation and converting of pressure sensitive adhesives for lamination of nylon to polyester fabric.
- Formulation of water based book binding adhesives.
- Formulation of hot melt book binding adhesives.
- Formulation of a fast drying construction adhesive.
- Formulation of epoxy and polyurethane construction adhesives.
- Process design for the manufacture of edge banding laminates.
- Formulation of two component acrylic adhesive for bonding synthetic marble.
- Formulation of a water based adhesive for bonding polyethylene to porous substrates.
- Formulation of a hot melt pressure sensitive adhesive for bonding aluminum to glass.
- Formulation of water based thermosetting pressure sensitive adhesives for laminating clear films to paper and plastic substrates.
- Formulation of ultra violet cured adhesives for medical applications.
- Formulation of synthetic rubber cement.
- Formulation of a polyurethane adhesive and encapsulant for a blood oxygenator.
- Formulation of hot melt furniture adhesives.
- Formulation and processing of acrylic pressure sensitive adhesives for a variety of tape applications.
- Formulation of hot melt toy manufacturing adhesives.
- Formulation and manufacturing specifications of a pressure sensitive label adhesive.
- Specification of a uv cure pressure sensitive adhesive for adhering polyethylene film to painted steel in an automotive application.

FORCON INTERNATIONAL

- Formulation of a water based adhesive for decorating textiles.
 - Formulation of a one component polyurethane adhesive for laminating foil and film in packaging applications.
 - Formulation and manufacture of a water based adhesive for masking tape.
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PAINT, INK AND COATING PROJECTS

- Formulation and manufacture of long lasting traffic paint.
 - Formulation and manufacture of solar absorber paint.
 - Formulation of paint for unprimed polyethylene.
 - Formulation of epoxy paint for protection of structural members from salt water spray.
 - Formulation and manufacture of water based inks for printing on polyethylene.
 - Formulation of anti slip coatings for high density polyethylene.
 - Formulation of water based spray and flow applied coatings for wood and steel furniture.
 - Formulation and manufacture of non-toxic paints for use by children.
 - Formulation of chemiluminescent paints for decorative use.
 - Formulation of non-toxic snow paint for use by children.
 - Formulation of water based paint stripper.
 - Formulation of water based anti-slip coating for leather.
 - Formulation of water based layout fluids for aluminum and steel.
 - Formulation of water based paints for staining steel components.
 - Formulation of solvent and water based masonry paints.
 - Formulation of epoxy paint for steel marine application.
 - Formulation of water based clear coating for wood.
 - Formulation and manufacture of varnish for oil paintings.
 - Formulation and manufacture of a workable fixative for charcoal and pastel drawings.
 - Formulation of a non-toxic coating to retard barnacle growth on ships and marine structures.
 - Formulation of a coating to enhance the grip on base ball bats, tennis racquets and other sports equipment.
 - Production modification and formula adjustments for a line of artists' paints and related products.
 - Formulation of a primer paint for outdoor wood application in wet environments.
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CLEANER PROJECTS

- Formulation and manufacture of a non chromic acid laboratory glassware cleaner.
- Formulation and manufacture of a surgical instrument cleaner for hospital use.
- Formulation and manufacture of a water based cleaner for printing rollers.
- Formulation and manufacture of a glass cleaner defogger.
- Formulation of a water less hand cleaner.
- Formulation of a military specification exterior aircraft cleaner.

FORCON INTERNATIONAL

- Formulation, manufacture and EPA registration of a hospital disinfectant.
- Formulation and manufacture of alkaline degreasers.
- Formulation and manufacture of cleaners for oil on canvas paintings.
- Development and EPA registration of an air conditioner disinfectant.
- Formulation of specialty soaps.
- Formulation of laundry detergents.
- Formulation and manufacture of a water based fabric stain remover.
- Formulation and manufacturing specification of a clear soap bar.
- Formulation of liquid dish washing products.
- Development of surfactant systems for acrylic resin emulsion paints.
- Formulation of a shower wall cleaner.
- Formulation of a non-streaking window cleaner.
- Formulation of exterior automobile and truck body cleaners.
- Formulation and manufacture of an optical instrument lens cleaner.
- Formulation of a laundry pre-spotting product.
- Formulation and manufacture of a detergent for cleaning equestrian garb.
- Formulation and manufacture of a water based pH neutral degreaser.
- Formulation of specialty cleaning products for dental applications.
- Formulation of a contact lens cleaning solution.
- Formulation of cleaning gel for stainless steel and porcelain.
- Formulation of an acidic cleaner for aluminum alloy heat transfer veins.

PERSONAL CARE PRODUCT PROJECTS

- Formulation and manufacture of a hardener for nail polish.
- Formulation, manufacture and packaging of a clear glycerine soap bar.
- Formulation of personal cleansing bar.
- Formulation of a contact lens cleaning solution.
- Formulation of specialty cleaning products for dental applications.
- Formulation of a cream for soothing damaged skin.
- Report and expert testimony on skin injuries from the use of hair treatment chemicals.
- Formulation of a cleansing lotion for industrial use.
- Formulation of mild shampoo.
- Development of a synthetic "skin" for a cardiac simulator.
- Formulation and manufacture of an insect repellent.
- Formulation and manufacture of a waterless hand cleaner.
- Formulation of a "mild" dish washing liquid.

PUBLICATIONS

Harold I. Zeliger
Theses

M.S. PLATINIZED ASBESTOS AS A FUEL CELL ELECTROCATALYST.
Study of electrocatalytic activity as a function of catalyst surface area.

Ph.D. STRUCTURE OF STABILIZED PHOSPHORUS YLIDES.
Variable temperature nuclear magnetic resonance spectroscopy studies on rotation barriers and geometry of phosphoranes.

Reports, Technical Literature and Patents

1. **DOPED TUNGSTEN OXIDES AS CATALYTIC PROMOTERS**, U.S. Army Corp. of Engineer Pub., No. 5, 108 (1964).
2. **ASBESTOS AS A REINFORCING AGENT IN FUEL CELL ELECTRODES**, *ibid*, No. 6, 141 (1964).
3. **OXIDE ELECTROCATALYST SUPPORTS**, *ibid*, 212 (1964).
4. **NOBLE METAL ALLOY HYDROCARBON OXIDATION ELECTROCATALYSTS**, *ibid*, No. 7, (1965).
5. **NOBLE METALS AND NOBLE METAL ALLOYS ON ACTIVATED SUBSTRATES**, *ibid*, No. 8, 243 (1965).
6. **SURFACE AREA MEASUREMENTS OF SUPPORTED NOBLE METAL BLACKS**, *ibid*, No. 9, 94 (1966).
7. **INFRARED ANALYSIS OF MAMMALIAN CANCER CELLS**, Nat. Inst. of Health Pub. No. PII43-66-1145 (1966).
8. **FUEL CELL PERFORMANCE AS A FUNCTION OF CATALYST SURFACE AREA**, J. Electrochem. Soc., 114, 144 (1967).
9. **PREPARATION OF SUPPORTED NOBLE METAL BLACKS BY WET HYDROGEN REDUCTION.**, J. Catalysis, 7, 209 (1967).
10. **A NEW AIR ELECTRODE FOR FUEL CELLS**, J. Electrochem. Soc., 114, 236 (1967).
11. **CATALYTIC ENHANCEMENT OF CARBON MONOXIDE AND REFORMER GAS OXIDATION IN FUEL CELLS BY SODIUM TUNGSTEN BRONZES**, *ibid*, 116, 152 (1969). (With L.W. Niedrach).
12. **SODIUM TUNGSTEN BRONZES AS FUEL CELL CATALYSTS**, U.S. Patent, 1970 (With L.W. Niedrach).
13. **EFFECTS OF AGING ON CANVAS BACKED PAINTINGS**, Proc. Int. Inst. of Cons., 14, No. 1, 17 (1973). (With G.A. Berger).
14. **EFFECTS OF CONSOLIDATION MEASURES ON FIBROUS MATERIALS**, Bull. Int. Inst. of Cons., 14, No. 1, 17 (1973). (With G.A. Berger).
15. **WAX IMPREGNATION OF CELLULOSE: AN IRREVERSIBLE PROCESS**, Proc. Conf. on Comparative Lining Techniques, National Maritime Museum, Greenwich, London, April,

FORCON

INTERNATIONAL

1974. (With G.A. Berger).
16. **IMPREGNATIONS OF FIBROUS MATERIALS: CHEMICAL CONSEQUENCES**, *ibid*, 1974 (With G.A. Berger).
 17. **POWER VS. POLLUTION: A NUMERICAL APPROACH**, Symp. on Env. Pollution, City of Hope Medical Center, Duarte, California, Aug., 1974
 18. **FLUE GAS DESULFURIZATION BY FLY ASH**, Fifth Ann. Indust. Air Poll. Control Conf., The Univ. of Tenn., Knoxville, Tenn., April, 1975
 19. **POLLUTION FROM POWER GENERATION: A MATHEMATICAL ANALYSIS**, Presented at the World Environmental Conference, Las Vegas, Nevada, Sept., 1975.
 20. **20. FLUE GAS DESULFURIZATION**, Chapter 25, in **POWER GENERATION: Air Pollution Monitoring & Control**, K.E. Noll, ed., Ann Arbor Science Publishers, 1976.
 21. **AIR POLLUTION: SOURCE SAMPLING & ANALYSIS**, National Resource Institute Environmental Engineering Seminar, Houston, Texas, May, 1976.
 22. **DETRIMENTAL EFFECTS OF WAX IMPREGNATION ON CANVAS**, Proc. Int. Inst. of Cons., 16, No. 1, 32, (1976) Venice, Italy, Oct., 1976 (With G.A. Berger).
 23. **POWER FROM WESTERN COAL**, Presented at the Joint Conference on Sensing of Environmental Pollutants, New Orleans, LA, Nov., 1977.
 24. **IDENTIFICATION OF FOUL TASTING COMPONENTS IN DRINKING WATER BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY**, American Water Works Assn. Conf., Atlantic City, New Jersey, March, 1980.
 25. **NEW COATINGS FOR POLYETHYLENE**, Presented at the Int. Symp. On Coatings, Atlantic City, New Jersey, March, 1980. March, 1980.
 26. **WEAR RESISTANT PAINT**, U.S. Patent No. 4,197,227, April, 1979.
 27. **ACTIVATION BARRIERS IN HETEROGENEOUS CATALYSIS**, Poly. Inst. of New York Seminar, August, 1983.
 28. **MARKETING CHEMICAL INVENTIONS**, State Univ. of New York. Continuing Education Seminar, March, 1984.
 29. **NUCLEAR HAZARDS**, Rockland Journal News, May 29, 1986.
 30. **TOXIC CHEMICALS IN WATER: UNSEEN DANGER**, Presented at Belli Society Seminar, Amer. Trial Lawyers Assn. Meeting, San Francisco, California, July, 1987
 31. **EFFECTIVE ADHESIVES MARKETING**, Adhesives Age, August, 1987.
 32. **TOXIC CHEMICALS: RIGHT-TO-KNOW LAWS**, Presented to the Society of Manufacturing Engineers, Cincinnati, Ohio, September, 1987.
 33. **METHOD OF RESTORING AND CONSERVING OIL PAINTINGS AND RESULTING INTEGRATED PERMANENT STRUCTURE**, U.S. Patent No. 5,019,441, 1991, (With F.J. Nussbaum).
 34. **EXPLOSIONS FROM UNDETECTED GAS LEAKS**, Presented at Belli Soc. Seminar, Amer. Trial Lawyers Assn. Meeting, Boston, Massachusetts, July, 1989.
 35. **HAZARD COMMUNICATION FOR TOXIC CHEMICALS**, Presented at Adhesives '89, Society of Manufacturing Engineers Conference, Atlanta, Georgia, September, 1989. (With D.S. Alter).
 36. **INHALATION HAZARDS OF LOW VAPOR PRESSURE CHEMICALS**, Presented at RADTECH '90 - NORTH AMERICA, Chicago, IL, March, 1990.
 37. **ABSTRACT SCIENTIFIC CONCEPTS IN THE COURTROOM**, Presented at The American

FORCON INTERNATIONAL

- Chemical Society Meeting, Division of Chemistry and the Law, New York, NY, August, 1991.
38. **PERMANENT RESPIRATORY INJURY FROM A SINGLE CHEMICAL EXPOSURE**, Presented at American Chemical Society Meeting, Division of Chemical Health & Safety, Washington, DC, August, 1992.
 39. **THE ROLE OF THE EXPERT WITNESS IN EXPLAINING TECHNOLOGY**, Presented at The American Chemical Society Meeting, Division of Chemistry and the Law, Washington, DC, August 1992.
 40. **CHEMICAL FIRE INVESTIGATION**, Presented at The Chem Show, New York, December, 1993. (With D.E. Zeligler).
 41. **SIMPLIFYING ABSTRACT CONCEPTS**, The Testifying Expert, Vol. 2, No. 1, January 1994
 42. **RESPIRATORY EFFECTS OF CHRONIC AND ACUTE EXPOSURE TO ARTISTS' MATERIALS**, Presented at The American Chemical Society Meeting, Division of Chemical Health and Safety, San Diego, CA, March 1994. (With D.E. Zeligler).
 43. **SPONTANEOUS COMBUSTION - ARTIST AND CRAFTSMAN BEWARE**, Presented at the American Chemical Society Meeting, Division of Chemical Health and Safety, San Diego, CA, March, 1994. (With D.E. Zeligler).
 44. **DANGER: ARTIST AT WORK**, Chemical Health & Safety, August, 1994. (With D.E. Zeligler).
 45. **MIXED USE CHEMICAL PRODUCTS: THE FUTURE OF HAZARDOUS CHEMICAL COMMUNICATION**, Presented at Manufacturers Alliance, Environmental Management Councils meeting, Ponte Verda, FL, May, 1996.