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Dr. Walter C. McCrone's Contributions To The Characterization And Identification Of Explosives

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Dr. McCrone was an amazing individual, possessing many talents and having many interests. He especially loved applying polarized light microscopy (PLM) to answering the question-at-hand and solving problems. He applied PLM to many different fields including the identification of air pollution particles, asbestos identification, art conservation, pharmaceuticals, industry problems and forensic sciences. A field that I believe he enjoyed the most was the characterization and identification of explosives. I remember a trip to Cornell University with Dr. McCrone in the mid-eighties where we were to teach a PLM course. After setting-up for the course, Doc took me on a tour around Cornell showing me the sites, including some of his old swimming holes and where Professor Chamot lived. He also told me a story of how, when he was a graduate student, there was young lady who was showing an unwelcome amount of attention. So Doc said he whipped up a batch of ammonium tri-iodide crystals and placed the crystals along the hall where he lived at that time. A few hours later he heard the door open and as the footsteps came down the hallway the ammonium tri-iodide crystals "popped". Doc was surprised they did not impede what he thought was the young lady and got up to answer the knock on the door. To his surprise it was Professor Chamot who said "What are you up to McCrone?". I am sure you wonder if the story is true but if you could have only seen the smile on Doc's face.

What is true is the report or the "bible" on the characterization and identification of explosives entitled "The Microscopic Examination of High Explosives and Boosters" that Dr. McCrone and co-workers developed for the military while he was at Cornell. This report laid the foundation for the analytical technique and application of fusion methods to the characterization of organic and inorganic high explosives as well as other compounds such as waxes that can be encountered in explosive mixtures. Some of the identification properties that one can quickly determine by observing a fusion preparation utilizing polarized light microscopy (PLM) are provided in Table 1. This report was the foundation for a more comprehensive treatment of fusion methods in his book "Fusion Methods in Chemical Microscopy" published in 1956. It was also the cornerstone for a more refined treatment of the subject he published in the "Microscope" in 1993[1]. I bet you did not know the dissolved gases that appear as you re-crystallize TNT from a melt caused numerous problems until it was looked at through a microscope and easily explained.

Throughout his life he continued work on, teach others, give presentations and publish articles on characterization and identification of explosives. Also, he encouraged other scientists to give presentations and to publish on the subject by providing "behind the scene" advice and/or be a co-author on a paper. This is what he did with two young forensic scientists in the early eighties and inspired them to publish two articles on the characterization and identification of inorganic explosives encountered in low explosive devices[2,3]. No one could take one of his courses without melting some TNT and watch with amazement as the crystals developed while viewing them by

PLM (Figure 1). I hope to show you a brief glimpse into the world of explosives as Doc saw it through the PLM.

[1] W.C. McCrone, J. H. Andreen, and S. Tsang, Identification of Organic High Explosives, Microscope, (1993) 161-182.
[2] T. J. Hopen and J. H. Kilbourn, Characterization and Identification of Water Soluble Explosives, Microscope (1985) 1-22.
[3] J. H. Kilbourn and W. C. McCrone, Microscope (1985) 73-90.

Table 1. Crystal Identification Properties
Morphology
Interfacial Angles
Crystal Systems
Refractive Index (Indices)
Birefringence
Extinction
Optic Axial Angle
Optic Sign

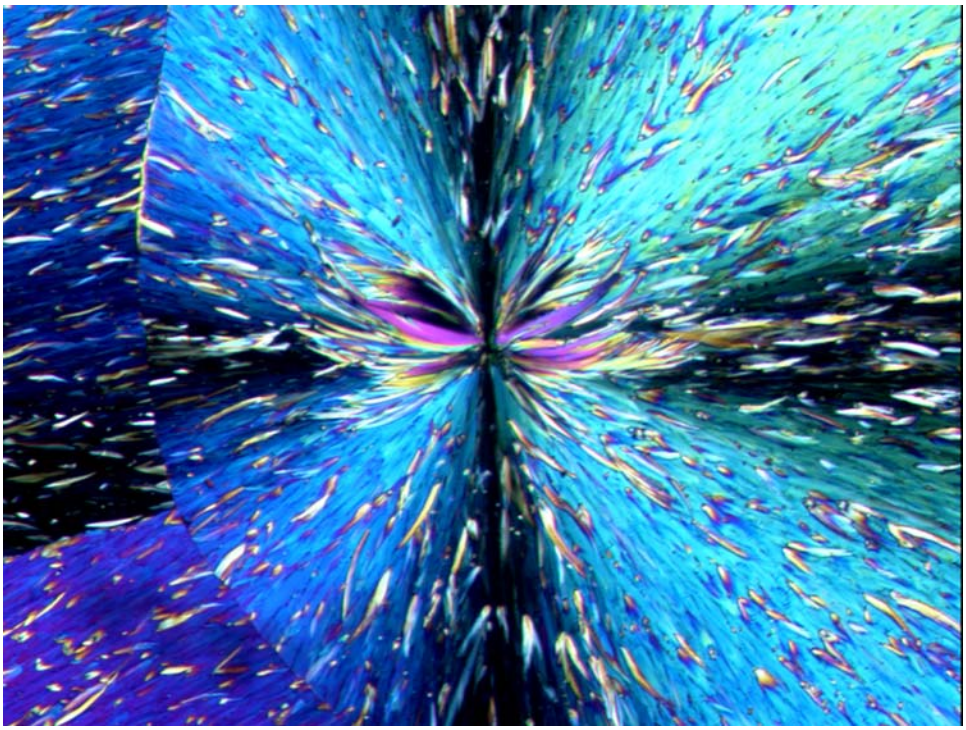

Figure 1) Fusion ppreparation of TNT viewed with crossed polars.

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