HYLE INTERNATIONAL JOURNAL FOR PHILOSOPHY OF CHEMISTRY. SPECIAL ISSUE: AESTHETICS AND VISUALIZATION IN CHEMISTRY

(including Virtual Art Exhibition: Chemistry in Art)

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Many painters who buy their tin sheets off the shelf today have little exposure to how artists prior to the 19th century worked with the finely ground minerals that were extracted from the earth and used for pigment. Nor do they recognize how closely art practice was intertwined with alchemy. To understand how to bind and mix paints, the artist needed to develop some measure of sensitivity to transmutability, and, as such, knowledge of the chemistry of alchemy aided the artistic practice. We see elements of the exchange between art and alchemy frequently in the works themselves, in which an artist might depict the mortar and pestle in his studio, or perhaps a distillation apparatus, or even the alchemist himself at work in his laboratory. Equally fascinating is our knowledge that the transition to the view that painting is an activity of the mind, which happened around the 14th and 15th centuries, occurred at a time when chemistry (then known as alchemy) found itself in a position similar to painting. Alchemists, too, were fighting the view that they were merely involved in a craft. When chemistry was recognized as a "full" science, in the 18th century, both practical and theoretical approaches to art had already, in effect, lost sight of the degree to which some knowledge of chemistry aided artists. Although chemical knowledge and discoveries continued to remain important in the manufacture and use of materials, collaborative efforts remained in the background. Views of aesthetics and the path of the academic tradition downplayed areas of overlap.

This history came to mind repeatedly while reading the special issue on Aesthetics and Visualization in Chemistry (edited by Tami I. Spector and Joachim Schummer), a far-reaching selection that conveys the many ways in which chemistry intersects with art practice, philosophy, history and scientific visualization. Although none of the essays explicitly look at how historical art practice incorporated the practices that were a precursor to the chemistry within alchemical practice, several touch on the symbolic, aesthetic and philosophical legacy shared by the arts and alchemy. Many, too, convey where the creative concerns of the artist and the chemist converge.

Each of the two volumes of this publication has a unique flavor. The essays in the first volume bring to mind the tension between chemistry's aesthetic qualities and experience in the studio/lab. The contributors also bring to light some positive definitional tensions among art, chemistry and aesthetics. The opening essay by Roald Hoffman sets the stage. He speaks of chemistry as an art, craft, business and science of substances and communicates the importance of drawing to experimental design. His framing of aesthetics in terms of the labor of human minds and hearts is convincing, as is his placement of the messier aspects of chemistry within the realm we associate with the artist's studio. "Experience" is also a factor incorporated into Pierre Laszlo's rolegemon to a chemical aesthetics, in which he presents 11 separate theses that were contradictory in form (e.g. two of his theses are that the natural is more beautiful and, conversely, the artificial is more beautiful). Laszlo conveys the mutability of chemistry and how difficult it is to wedge it into any materialist worldview. Laszlo also nicely captures that chemists, like artists, learn from experiments. Particularly effective is the way he brings to the fore the importance of smells and colors in chemistry and balances this with the need for visualization.

In terms of traditional ideas, Joachim Schummer's expanded view on practices and epistemological questions is quite useful. This author incorporates a philosophical history that speaks to circumstances that have influenced how we see art, aesthetics and chemistry. As he correctly explains, in idealistic aesthetics, the dominant doctrine in the Western tradition since Plato, there is no place for the senses of taste, smell, touch and color, as there is no place for the sensations of material qualities other than representing the opposite of beauty. His systematic investigation of the aesthetics of chemical products distinguishes between three types of chemical products (materials, molecules and molecular models) and then aligns them with aesthetic theories. By combining the chemical overview with aesthetics' history, Schummer demonstrates that many aesthetic theories are poorly developed. He also makes a convincing case for chemistry's power to shift our perspective: "Rather than the putative beauty of chemical products, further investigations should explore where and how aesthetic experience becomes part or even a driving force of the research process" (p. 99).

The second volume focuses more on historical episodes. Barbara Obrist explores major trends in visualization during the medieval period in her article "Visualization in Medieval Alchemy." Analyzing theories of natural and artificial transformations of substances in relation to their philosophical and theological bases, she traces three different pictorial types from the 13th to the 15th century, examines lists and tables, geometrical figures, depictions of furnaces and apparatus, and
figurative elements from both the vegetable and animal realms. This range allows her to explain that alchemy "was not merely a contemplative discipline and that its operations resulted in the work of alchemists should not be considered a part of the history of chemistry. Richly illustrated with 15 figures, the visual aid provided by the presence of visual information in medieval alchemy. Her conclusion is that symbolic representation eventually gave way to images of apparatus in practice-oriented alchemical writings. Leads nicely into David Knight's investigation of illustrations made precisely to visually represent chemical dynamics in chemistry per se. He postulates that it was Lebknecht's Elements (1789) that the place of imagination and symbolic language in chemistry was much reduced. Indeed, this chemist moved the illustrations from metaphor to science. As a result, he was instrumental in transforming the scope for aesthetic judgment and imagination in this field.

The highlight of the volume is the virtual exhibition. Although my computer was not compatible with the enclosed CD-ROM, I was delighted to find that the juried selection "Chemistry in Art" and the curatorial project (jointly directed by art critic David Spalding and Tami Spector) are accessible online: [http://www.wyle.org/arcia/files/index.htm]. "Chemistry in Art" grew out of a call for papers and offers an incredible contrast in ways we might think of art and chemistry combinations. Included are projects and installations by Blair G. Bradshaw, David Clark, Erich Fildes, Brigitte Hirschler, Lane E. Last, Paula Levine, Christopher Puzio, Cheryl Safwen and Tamar Schor. Of particular note is "Chemical Vision: The Science Museum of Metachemistry" by David Clark (from the Nova Scotia College of Art and Design, Canada), who received a special award for his contribution. As he explains on the web site:

"Chemical Vision is a large-scale, walk-through interactive installation that has resonances of a science museum. Architecturally, it is derived from the shape of the periodic table, and in a more Specifically the Meyer table that has become synonymous with periodic law—an image which has become a metonym of the discipline of chemistry itself.

This curatorial project, on the other hand, aimed to highlight chemistry-related artworks by renowned artists Kim Abeles, Cai Guo-Qiang, Susan Robbins, Fred Tomaselli and Shirley Tse.

The one essay I found disappointing was the Elkins piece "Four Ways of Measuring the Distance Between Alchemy and Contemporary Art." His aim is to explain why alchemy is central to contemporary visual art and why it is marginal as all. Although he claims to incorporate the history of chemistry, I found little within the article that looked at the field's experimental history, particularly as it relates to alchemy. Instead, Elkins' thoughts are primarily built around alchemical images and ideas. He concludes:

"A strategy of painting, as well as the older chemist, is to increase the feeling of meaning without the force of quality of naked written meanings. A feeling of meaning is an intuition of meaning, the result of mingling "word" and "image," and picture. The result is an incomplete fusion; in viewer's terms, it is a for meaningless reading and incomplete viewing. Recent painting has achieved objects that are neither word nor image, and they stand directly on the heritage of alchemy. That, I think is the deepest connection between the history of alchemy and contemporary art, and one that is still waiting to be explored." (p. 115)

I would have preferred more exploration of this history. Instead of concretely grappling with the alchemical experience and the gained knowledge that allowed the experimental side of the work to build basic understandings of how transformation takes place, too much of the article centered on the incorrect responses by readers to his book, What Painting Is (an earlier attempt by Elkins to equate the process of painting with alchemy). I recall how, when reading the book, I thought his descriptions of the process of painting established some acquaintance with studio experience and yet for some inexplicable reason the "alchemical" focus was predominantly theoretical, symbolic and physical. I found quite Jungian and so was not surprised to discover (in his Hyle essay) that many thought he offered a Jungian view in the book. His efforts in this essay to clarify why this conclusion is incorrect did not convince me. Overall, his dual-sided argument fails to acknowledge the degree to which gaining knowledge through experimental work with materials and techniques was operative under the alchemical umbrella and is still operative in some quarters today. Interpretations that focus on layers of meaning, and the narratives that support each layer, fit easily into the art-historical tradition in which the mind is (and was) elevated. Indeed, as his article reminded me, the symbolic/metaphorical framework that came to define theorizing about art has obscured the degree to which scientific knowledge, technological innovation and the ability to make materials effectively are equal partners in art practices of earlier eras.

In summary, Aesthetics and Visualization in Chemistry is a solid and comprehensive contribution to literature. The exhibition combines nicely with the scientific theoretical ideas. Historical and contemporary topics offer a balance. Similarly, the way in which modes of visualization are woven through the writings is thought-provoking. Throughout the issue it is clear that alchemy did provide a theoretical framework that enabled experimenters to make sense of the changes that the agencies of fire, water, air, vapor and time wrought on materials, just as chemistry continues to provide a rich source of inspiration for art today. This issue also offers a taste of the aesthetic cognition of the chemist and exposes fascinating intersections between art and chemistry today. Finally, it was fun to read and review this volume. Aside from the stimulating exhibition, which elevated the project significantly, several of the writers added that the topic reminded me of why I have always seen chemistry as the most magical of all the sciences. Chemistry became "human" in my favorite essay of the volume, Robert Root-Bernstein's "Sensory Chemistry." Root-Bernstein succeeded in conveying that the experience of chemistry as an aesthetic combines the hands-on and cognitive experience. His arguments are held together through his references to Hubert N. Alvea, who taught his introductory chemistry at Princeton. According to Root-Bernstein, this professor made chemistry come alive to him as well as other students. Indeed, he was so popular at Princeton that hundreds of alumni packed the chemistry auditorium every year to watch Alvea convert Yale colors (blue and white) into Princeton's colors (orange and black). After reading this, I found myself telling everyone the story and, as a result, the issue successfully stimulated a great deal of conversation about chemistry with my colleagues—no doubt a positive recommendation in and of itself.