The Chemical Revolution and Perspectivism

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The Chemical Revolution has long been a case study for philosophers and historians. This Revolution in science revolved around a disagreement between phlogiston and antiphlogiston chemists. A recent philosophical exchange has re-ignited a central question about this period: how should we think about disagreement in science? Chang (2012, 2015) defends a normative pluralism view and Kusch (2015) argues for a sociological reading. Klein offers what we might call a deflationist reading. Missing from this exchange is a view with stronger realist commitments. I hope to motivate a view from this stronger position.

Normative pluralism suggests that phlogiston and antiphlogiston chemists formed two incommensurable systems of practice with different goals, methods, and measures of success. The normative claim is that more systems of practice are better than fewer and that we should not eliminate one system in favour of another. The sociology reading suggests social factors reasonably motivated a resolution to the chemical debate and that we should not endorse a plurality of scientific practices. Kusch appeals to testimonial knowledge and trust in developing this sociological reading. Finally, Klein (2015) argues that changes in chemistry during the late 18th century were minor and not wellcharacterized as a "revolution."

In this talk, I revisit the original disagreement between phlogiston and antiphlogiston chemists and argue that both philosophical readings miss important nuances. I will suggest an alternative, perspectival reading, Giere (2006) claimed that a scientific perspective offers a partial, selective conception of a limited aspect of the world. I will make a related, but different point, which is that there are different ways of evaluating evidence, based on historical context and expertise, and that these different evaluations give rise to different interpretations and classifications. My purpose in appealing to a perspective is to acknowledge Chang's point that there are deep differences between scientists who disagree, but at the same time to avoid denying the rational resolution of those disagreements. Chemists, I will claim, formed part of the same practice because of the extensive overlap in concepts, problems, and explanations endorsed by both phlogiston and antiphlogiston chemists. This overlap allowed chemists to engage and respond to one another's work, thereby participating in the same practice. This extensive overlap is an important feature of chemistry as practiced by both phlogiston and antiphlogiston chemists and has underappreciated significance. At the same time, different chemists occupied different perspectives in that they prioritized and used evidence differently to develop rival conceptions of specific chemical phenomena. A system of practice suggests the divisions between scientists are very deep—incommensurable—whereas a perspective suggests a much milder division, one based on evidential reasoning and concepts, but with extensive shared background and, crucially, the ability to engage with one another in meaningful discourse and disagreement.

In applying the notion of a perspective to the chemical revolution, I argue that there were good, objective reasons to adopt the oxygen perspective over the phlogiston perspective. I suggest that the use of the balance in chemistry was a well-established and reliable method that many phlogiston and antiphlogiston chemists trusted. Even though Lavoisier, the founder of oxygen chemistry, used the balance for new purposes and with increasing precision, it would have been hard to imagine how chemists during this period could long remain sceptical of his methods—and thus remain phlogiston

chemists—given that the practice of weighing substances was so well established, even among phlogiston chemists.

I motivate this perspectival interpretation by appealing to several experiments that were directly involved in phlogiston debates, specifically Lavoisier's gun barrel experiment and two responses to it, one by Kirwan (1789) and the other by Priestley (1800). These texts were not directly focused on the existence of phlogiston, but rather on whether water is a compound or a simple substance. This case shows that there was widespread use and trust of the balance. It also shows that Priestley and Kirwan evaluated evidence different from antiphlogiston chemists like Lavoisier and this difference in evidence evaluation led to completely opposite interpretations of the same experiment. However, Lavoisier's perspective is better supported, I will suggest, because his way of evaluating evidence was more consistent with scientific norms, suggesting there was in fact better reason to adopt oxygen chemistry than to not do so.

This perspectival reading gives an account of the Chemical Revolution that avoids rationally unresolvable disagreement without appealing to social factors and to this extent has a stronger realist flavour: chemists were engaged in a debate about worldly phenomena and this debate was resolvable with recourse to objective, shared norms of evaluating evidence. My view will tend toward Klein's in that I suggest a greater level of continuity between phlogiston and antiphlogiston chemists, a continuity that includes the use of weight and concepts like "simple substance," though my interpretation may suggest there was more change than Klein would endorse.