

## Citation Classics

**Wilson A J C.** Determination of absolute from relative x-ray intensity data. *Nature* 150:151-2, 1942.

**The average value of the intensity of an X-ray reflexion is given, and a comparison made between observed relative intensities of reflexion and the sum of the squares of the atomic scattering factors. This gives the approximate values of the conversion factor required to place the observed intensities on an absolute scale, and the overall temperature factor. [The *SCI*<sup>®</sup> indicates that this paper was cited 824 times in the period 1961-1975.]**

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April 6, 1977

"Perhaps appropriately in view of its statistical nature, the existence as well as the popularity of this paper is largely a matter of luck. It originated as my 'referee's report' on the paper by Yü<sup>1</sup> immediately preceding it in *Nature*. If the editor of *Nature* had not sent Yü's paper to the Cavendish Laboratory for refereeing, if I had not been the most mathematically inclined crystallographer at the Cavendish at the time, and if my mind had not been full of statistical ideas concerned with mistake broadening in X-ray powder photographs of metals, it is unlikely that the problem (and even less likely that the solution) would ever have occurred to me. The paper appeared in the middle of World War II and attracted no interest at the time; the earliest citation known to me (and that by myself) is dated 1949.

"About 1948 D. Harker<sup>2</sup> and E.W. Hughes<sup>3</sup> rediscovered the essential idea, independently of me and of each other. Luckily for my citation rating, I noticed their publications, and immediately sent reprints of my paper to them and other crystal-lographers in key positions. Otherwise, it might be Harker or Hughes that would be heading the crystallographic popularity charts, rather than Wilson.

"Luck aside, why is it that this short paper has been cited about as frequently as all my other papers put together, and ranks sixth in total citations on the *SCI*<sup>®</sup> list of highly-cited physics, chemistry and mathematics papers published in the 1940s?<sup>4</sup> I think there may be four reasons.

"(1) It is short and, as such papers go, readily understandable.

"(2) It provides a method for obtaining quickly approximate values of two quantities of considerable use in the early stages of any structure analysis, and thus tends to be quoted in many structural papers.

"(3) It was the first paper, as far as I know, to apply statistical ideas in structural crystallography, and thus tends to be quoted by many of those who are using statistical methods in developing, for example, direct methods of structure determination (There are earlier statistical papers, including one of my own, in 'textural' crystallography.)

"(4) One phrase, almost a throw-away, 'certain coincidences can be predicted from the space group only,' contains the germ of several later papers by myself and by others.

"All this said, however, it seems to me that some of my other papers are more worthy of a high citation rating, and that perhaps some of those that in fact out-rank it [on the 1940s list] ought to come lower down!"

1. **Yü S H.** Determination of absolute from relative x-ray intensity data. *Nature* 150:151-2, 1942.
2. **Harker D.** Absolute intensity scale for crystal diffraction data. *American Mineralogist* 33:764-5, 1948.
3. **Hughes E W.** Limitations on the determination of phases by means of inequalities. *Acta Crystallographica* 2:34-7, 1949.
4. **Garfield E.** Highly cited articles. 36. Physics, chemistry and mathematics papers published in the 1940s. *Current Content*<sup>®</sup> No. 10, 7 March 1977, p. 5-11.