'dead time' during automatic recording for which there is no practical correction. When manual scanning was used, and a correction was made for dead time, Klug and Alexander verified that only three primary standards yielded an accurate straight line over the entire weight range in quartz/fluorite mixtures. The only way to obtain an accurate curve with automatic recording is to plot more points: fourteen standards were necessary for the curves shown in Figs. 1 and 2. Similar results in the detection of small percentages by weight and in the departure of the working curve from linearity have been reported by Carl[10], who used the same type and model of X-ray spectrometer with automatic recording on quartz/beryllium oxide mixtures.

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Intensification of the Photographic Image

THE overall quantum yield for the production of developable silver in the silver halide grains of a fast photographic emulsion struck by light is of the order of 10^9. I have found that the catalytic effect of the exposed silver halide grain can be increased by a factor of one million by utilizing the amplification available in chain polymerizations.

Aromatic amines used as photographic developers pass through a semiquinone or free radical state in the course of their oxidation[1,2]. In some cases the free radical will initiate the polymerization of vinyl monomers. Thus, as each silver atom is produced, a semiquinone radical is formed which will initiate a chain reaction with a kinetic chain-length of as great as one million so that the overall quantum yield is 10^{15}. Not all aromatic amines will initiate polymerization when oxidized; in fact, the majority are polymerization inhibitors under alkaline conditions[3]. I have found, however, that polymerization of vinyl compounds is initiated when silver halide crystals struck by light are placed in contact with *p*-aminophenol at *p*H 8·0. The exposed crystals without developer will not initiate polymerization.

A suspension of silver bromide crystals (average size about one micron) was made up in water using a trace amount of glue as the stabilizer. The suspension was exposed to blue light and then divided into two parts. One part was developed with a 1/10 *M* solution of *p*-aminophenol hydrochloride buffered at *p*H 8·0 and the other was developed with the same solution but which also contained 20 per cent by weight of calcium acrylate. After 15 min. the sample which was treated with monomer turned an intense black and a large precipitate finally settled out. The sample without monomer turned into a murky brown stable suspension. Suspensions which had not been exposed to light remained unchanged whether or not the developer solution contained monomer. Apparently the polymer produced serves to bind the exposed and developed crystals; this thereby exhibits a very dense image, since light scattering per unit weight of developed silver is considerably decreased on aggregation of the grains[4].

A variation of the above experiment was carried out with a photographic plate containing silver bromide crystals in gelatin gel. The plate was exposed to feeble light just sufficient to produce an image which was barely perceptible when developed by conventional means. When developed with *p*-aminophenol and monomer, together with a short warming at 35° C. to allow for mobility of the grains, an intense black image was produced. This intensification of the image was produced at the sacrifice of some resolution, however.

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The Clock Paradox in Relativity

As I have repeatedly pointed out, symmetrical ageing in this problem is an inevitable requirement of the postulate of relativity. I have given the argument in the simplest possible form[1] in order to facilitate refutation if it is indeed wrong. I therefore find it inexplicable that Sir Charles Darwin[2], while completely ignoring this argument (in which he is at one with all other critics), can write that "the accepted theory of relativity . . . quite definitely implies that a space-traveller will return from his journey younger than his stay-at-home twin brother". His reason for this assertion appears to be identical with that of Dr. J. H. Fremlin, on which I have already commented[3]. Since that comment appears to have been inadequate, I will consider the problem posed in more detail, in order to bring out what I believe to be the misconception underlying such arguments as that of Sir Charles Darwin.

The problem is this. S_0 and S_1 are originally together. S_1, by firing rockets, travels at uniform velocity V to and from a distant point. During their separation each sends out n light flashes per unit time by his clock, which the other receives. (In arguments, as distinct from illustrations, I prefer general symbols to numbers, to avoid accidental coincidences.) How many flashes does each send out and receive during the journey ?