

Sandstone to indicate the upper part of the Keuper Sandstone is most undesirable.

Those who have been compiling the "Lexicon of Stratigraphy" have good cause to know the confusion which reigns as a result of the indiscriminate use of 'Lower', 'Middle' and 'Upper', and many similar examples in British stratigraphy could be quoted. It is to be hoped that the Geological Survey, particularly bearing in mind the German usage, will not now add new sources of difficulty at a time when it is widely agreed that there is great need for some simplification and clarification of the nomenclature.

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¹ Pugh, Sir William J., *Nature*, **187**, 278 (1960).

² Wills, L. J., "The Palaeogeography of the Midlands", 61 (1948).

³ Brodie, P. B., *Quart. J. Geol. Soc. Lond.*, **12**, 374 (1856).

⁴ Matley, C. A., *Quart. J. Geol. Soc. Lond.*, **68**, 252 (1912).

⁵ Hull, E., "The Triassic and Permian Rocks of the Midland Counties of England", *Mem. Geol. Surv. U.K.*, 66 (1869).

THE Geological Survey of Great Britain produces geological maps distinguishing strata with particular lithological characters and ages; thus Chalk is singled out from other limestones and given a particular colour on small-scale geological maps; on larger-scale maps certain hard bands have been used to divide the formation into Lower, Middle and Upper Chalk; likewise, some argillaceous strata of wide-spread distribution containing marine fossils are now used to divide the Coal Measures into Lower, Middle and Upper Coal Measures.

In the recent article on Triassic Salt in the Cheshire and Shropshire Basin, it was shown that two horizons of Saliferous Beds would be used to divide the Keuper Marl formation into Lower, Middle and Upper divisions in Cheshire. This will replace the older division into Lower and Upper Keuper Marl, which was used, for example, on the 1958 edition of One-inch Sheet 97 (Runcorn) before the Upper Saliferous Series was known to exist¹.

The use in geology of saliferous horizons as indicators of the past existence of particular climatic conditions over wide areas is not new. Accordingly it is considered that Lower, Middle and Upper Keuper Marl are legitimate terms for the depiction of strata on the geological map, and that to describe such usage as "indiscriminate" is misleading. It is well known that the British nomenclature of subsystemic units is far from ideal; and from time to time the Geological Survey is obliged to accommodate new discoveries by division of time-honoured units, in the present instance the Keuper Marl. In making this particular decision, the names Lower, Middle and Upper Keuper Marl were considered suitable; and no alternative was considered, such as the invention of stratal names based on localities. Such a course may well be taken, however, when investigations are completed on the beds "provisionally called Upper Keuper Sandstone".

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¹ See also Summary of Progress of the Geological Survey of Great Britain and Museum of Practical Geology for 1954, 38 (1955).

METALLURGY

Non-crystalline Structure in Solidified Gold-Silicon Alloys

EXCEPT for thin films deposited at very low temperatures¹, highly disordered arrangements of the atoms, similar to that of the liquid state, have never been observed in solid metals and alloys. For some metalloids, the bonding of which may actually be more covalent than metallic, such amorphous configurations have been retained in the solid state² by cooling from the melt with sufficient celerity so as to prevent formation of the equilibrium crystalline structures.

It is thus conceivable that such non-crystalline structures can be obtained for some, perhaps all, metals and alloys by quenching rapidly enough from the molten state. In the course of experimentation with the apparatus developed by us³, an amorphous structure has been detected in a 25 atomic per cent silicon-gold alloy which was quenched from $\sim 1,300^{\circ}$ C. to room temperature.

The quenched alloy was studied by means of X-ray diffraction. A flake (area ~ 0.2 mm.²; thickness $\sim 10\mu$) was mounted in a Debye-Scherrer camera and exposed to copper K radiation. Intensity (on an approximately linear scale), as obtained from the film with a microphotometer, is plotted against $\sin \theta/\lambda$ in Fig. 1.

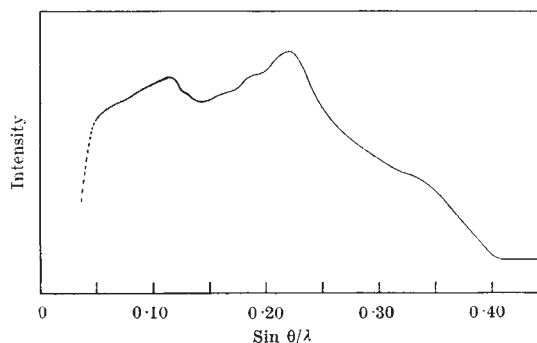


Fig. 1. X-ray diffraction pattern of gold-silicon alloy

It is to be emphasized that the amorphous foil is quite unstable at room temperature (and it is entirely possible that some decomposition could have occurred during the 3-hr. exposure). The decomposition products detected after 24 hr. at room temperature have complex crystal structures, involving d -spacings of the order of 11–12 Å. It is quite probable that many phases may be present under these non-equilibrium conditions. However, at this stage of decomposition, the equilibrium phases are definitely not present.

Since the synthesis and investigation of these amorphous foils are highly uncertain under the present experimental conditions, refinement of the apparatus so as to permit operation at liquid-nitrogen temperatures is now under way. Among the various facets of such non-crystalline metals and alloys which might be of interest, possible superconducting properties should be considered—especially since Buckel¹ has observed that certain metals in thin evaporated layers (amorphous structure) become superconducting at somewhat higher temperatures than with the normal crystal structures.