

ferrous compound, probably the hydroxide, which is gradually oxidized to the black oxide as air penetrates to the tissues. Although as yet supported by no direct evidence, this theory fits not only the facts established in the present work but also a number of hitherto unrelated observations of other workers in the same field, such as that of Tinckler¹ that the black pigmentation was induced in normal potatoes by contact with rusting iron during boiling, and the evidence obtained by Ross and Tottingham² that the proteins of blackening potatoes are more easily hydrolysable and autolysable than those of normal tubers.

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¹*Biochem. J.*, **25**, 773 (1931).
²*J. Agric. Res.*, **57**, 453 (1938).

Plagiophyres in an Intrusion at Downpatrick

IN 1937 B. C. King¹, in a petrographical examination of some Caledonian hypabyssal rocks from Kirkcudbrightshire, recorded the occurrence of plagiophyres in the dyke assemblage of this area.

Recent examination of a small intrusion at Slievenagiddle, two miles east of Downpatrick in Northern Ireland, has resulted in the discovery of this rock-type in the hypabyssal phase of the Newry 'granite' mass. The intrusion was originally recorded by the Geological Survey of Ireland², and on macroscopic examination was described by the Survey as syenite. In thin section the rock is seen to correspond closely to the Scottish plagiophyres; mafic minerals being entirely represented by chlorite, feldspar and albite-oligoclase, abundant secondary calcite, etc.

Dykes of this Irish suite have been described from the Ards Peninsula³ and the Killough-Ardglass coast⁴, and are dominantly lamprophyric in these two areas. It is probable that further examination of this dyke-swarm towards the south-west (and the Newry 'granite') will reveal a more extensive variety of rock types than are at present known from the County Down area.

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¹King, B. C., *Proc. Geol. Assoc.*, **48**, 282-306 (1937).
²*Mem. Geol. Surv. Ireland*, Sheets 49, 50, 61, pp. 15 and 47.
³Reynolds, D. L., *Geol. Mag.*, **63**, 97-111 and 145-165.
⁴Tomkeieff, S. I., and Marshall, C. E., *Quart. J. Geol. Soc.*, **96**, 321-338.

Specific Heat of β -Brass

My previous theoretical work¹, based on a method of approximation, has been criticized by Bethe and Kirkwood². I have now carried out a rigorous evaluation of the partition function at constant volume, starting first with the two dimensional quadratic lattice.

Three partition functions are calculated succes-

sively, namely, $P(1)$, $P(n)$ and $P(n^2)$ which refer to: a square of four atoms, the 'elementary cell'; a ladder consisting of n elementary cells joining in one dimension; and the whole lattice, which consists of n ladders joined together with their lath.

$P(1)$ is a sum of eight terms according to the eight possible configurations of the cell. In order to account for the statistical correlations of the cells (the long-range order effect), the terms of $P(1)$ are considered to be the coefficients of a certain quadratic form in two variables and $P(n)$ to be the n -fold iterated quadratic form. Similarly, the terms of $P(n)$ are considered to be the coefficients of a quadratic form in 2^n variables and the n -fold iterated form to be equal to $P(n^2)$. In these calculations the form in a large number of variables is reduced to a product of forms in two variables.

In the limit, $n \rightarrow \infty$, $P(n^2)$ is found to be equal to $[p(x, y)]^n$ where $y = x = \exp(-\phi/kT)$ and ϕ is a constant of the dimension of an energy. The mean energy is equal to $\phi y \partial \log p / \partial y$. The function $p(x, y)$ has the following form:

$$p(x, y) = \frac{1}{2} \{ (1+y) [(1-x^2)^2 + 8x^2(1+y) + (1-x^2)\sqrt{1+14x^2+x^4}] + \sqrt{2} [(1-x^2)^4(1-y)^2 + 32x^4(1+14y^2+y^4) + 8x^2(1-x^2)^2(2-3y+8y^2+y^3) + (1-x^2)^3(1-y)^2 + 8x^2(1-x^2)(1-y+7y^2+y^3)] \sqrt{1+14x^2+x^4} \}^{1/2} \cdot [(1+14x^2+x^4) + (1-x^2)\sqrt{1+14x^2+x^4}]^{-1}.$$

It is independent of n and has no singularity. The specific heat curve has a broad maximum which has no resemblance to a λ -point.

The method applies to a lattice in three dimensions, and calculations are in progress.

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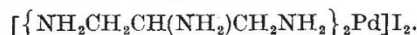
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¹*Proc. Roy. Soc., A*, **168**, 546 (1938).
²*J. Chem. Phys.*, **7**, 578 (1939).

Metallic Triazine Complexes

IN a recent note¹ referring to the palladium derivatives of diazoaminobenzene and of 4:4'-dimethyl-diazoaminobenzene described by Dwyer², it was stated that these compounds, containing one palladium atom united to three diazoaminobenzene units, "appear to be the first examples of hexavalent palladous compounds [to be] described", this statement being made also by Dwyer in his original paper.

Actually, however, I have described the first such compounds³, having prepared both platinous and palladous salts of $\alpha\beta\gamma$ -triamino-propane, the palladous derivative having the formula



Evidence was adduced to show that in such compounds all the amino-groups were co-ordinated to the metal, which was therefore undoubtedly hexavalent.

Apart from this certain case, it is probable that the black crystalline compound⁴ of empirical formula $(\text{NH}_3)_2\text{PdCl}_3$ has the constitution shown, containing one hexavalent palladous and one hexavalent palladic atom, bridged by the two chlorine atoms⁵. In this case the compound would exist as a resonance