varieties, is defined by a very small, or by no apparent endotherm between 100° C and 200° C.

TABLE I. Spectrographic analyses of opal

	Lightning Ridge		Coober Pedy		Andamooka	
Source	Precious	Common	Precious	Common	Precious	Common
H_2O	6·0 %	6·1 %	6·4 %	5·9 %	5·7 %	4·9 %
Al_2O_3	2·5	1·6	1·8	1·5	1·3	1·2
Fe_2O_3	0·3	0·2	0·2	0·15	0·2	0·15
TiO_2	0·1	0·04	0·01	0·01	0·01	0·01
ZrO_2	0·02	0·02	0·01	0·01	0·04	0·04
CaO	0·9	0·6	0·8	0·8	0·3	0·2
MgO	0·1	0·04	0·05	0·05	0·05	0·05
Na_2O	0·4	0·15	0·4	0·3	0·05	0·1
MnO	0·02	0·002	0·0015	0·001	0·001	0·001
CuO	0·006	0·01	0·0008	0·0004	0·0004	0·0004
NiO	0·002	0·003	—	—	—	—
CoO	0·0025	0·005	—	—	—	—
Ag_2O	—	—	0·002	0·002	—	—

In conclusion, precious opal is similar to the associated common opal with respect to the following mineralogical properties: X-ray diffraction pattern, trace element content, thermogravimetric curves, and differential thermal curves.

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Berek compensator

IN determining the retardation, Γ, of a mineral with a Berek compensator, the expression $\Gamma = C.f(i)$ is used, where C is the compensator constant and $f(i)$ is a function of the average angle of rotation, i, measured from the zero position of the compensator. The values of C and

$f(i)$ can be obtained either from the makers' tables, or, when the tables are lost, from the procedure given by Naidu.[1] In the method of Naidu, the $f(i)$ values are obtained by using the Berek's expression:

$$f(i) = \sin^2 i\{1+0{\cdot}2040 \sin^2 i+0{\cdot}0627 \sin^4 i\}.$$

The authors find that the above expression can be replaced by a simpler expression:

$$f(i) \approx \{(i-\epsilon_i)\pi/180\}^2 \approx 0{\cdot}000305\ (i-\epsilon_i)^2,$$

where ϵ_i is a small correction to the measured i value, within the accuracy of the instrumental observations (tabulated below). Although no mathematical proof could be offered for the above expression, it was found that the calculated $\log f(i)$ values for all possible i values are either equal to the values given in the makers' tables or greater by an amount not exceeding 0·004.

Range in i	ϵ_i
$<$ 16·5	0·0
16·6 to 20·6	0·1
20·7 to 24·0	0·2
24·1 to 26·8	0·3
26·9 to 28·6	0·4
28·7 to 30·7	0·5
30·8 to 32·0	0·6
32·1 to 33·7	0·7
33·8 to 34·5	0·8

In determining the birefringence of a mineral by the 'comparison-mineral method', the following expression, which makes use of neither the section thickness nor the compensator constant, may be used: $\delta_x/\delta_y = f(i)_x/f(i)_y$, where δ_x and δ_y are the birefringences and $f(i)_x$ and $f(i)_y$ are the $f(i)$ values of the unknown and the comparison minerals respectively. On substituting the values of $f(i)_x$ and $f(i)_y$, according to the proposed expression, $\delta_x/\delta_y = (i_x-\epsilon'_i)^2/(i_y-\epsilon''_i)^2$, where ϵ'_i and ϵ''_i are the corrections to be made to i_x and i_y respectively.

Thus the above expression can be used for the determination of birefringence, without using the makers' tables, to a reasonable accuracy.

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