AUSTRALIAN GEMMOLOGIST

First published 1958

THE JOURNAL OF
THE GEMMOLOGICAL ASSOCIATION OF AUSTRALIA

Vol. 18, No.4 **November 1992**

Correction. The Federal Vice President representing the Tasmanian Division is Mrs J. Beresford, RMB8751 Collins Gap Road, Molesworth, Tas. 7140 (Refers page 91, August issue.)

PRINTER'S ERROR: Please note that the Great Ball at the 47th Annual Federal G.A.A. Conference will be held at the National *Gallery.* The word Gallery was omitted from the description on page three of the inserted Conference leaflet.

Cover picture, ***Antique Gemmological Scales. 1ct weight is 0.2053 grams, smaller weights are in fractions, not decimals. (See page 117.)***

The Australian Gemmologist is published 4 times a year and is the official journal of The Gemmological Association of Australia.

Address for Correspondence. All correspondence relating to the journal should be forwarded to P.O. Box 35, South Yarra, Vic, 3141, Australia. For other association addresses, see last page.

Subscriptions Rates 1993. Annual Subscription, calendar year only, within Australia $26. Overseas by Surface Mail $31. Air mail rates, see last page.

Typeset and printed by Research Publications, Vermont, Victoria.

1992-1994 **Vol. 18, No.4** **pp101-140** **Melbourne** **ISSN 004-9174**

Hofer Gemstone Colorcard

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Instrument Evaluation Committee

Gemmologists, gem merchants, and jewellers can now purchase a simple, inexpensive colour card that they may use to estimate the colour temperature* of any common light source, or illuminant, under which they may be required to examine and/or grade diamonds and coloured stones. This potentially useful aid can be purchased from its inventor — Stephen Hofer, of Colored Diamond Laboratory Services Inc., P.O. Box 583, Canton, CT. 06019 USA.

THE COLORCARD

As purchased, the Hofer Gemstone Colorcard kit consists of an outer paper envelope that holds:

An instruction sheet describing the correct use of the Colorcard.
A sheet recommending ideal lighting conditions for selling coloured stones.
A 110x75 mm white vinyl carrying case for the Colorcard (Fig. 1 - Right).
A folded Gemstone Colorcard.
A Lighting Reference Guide.

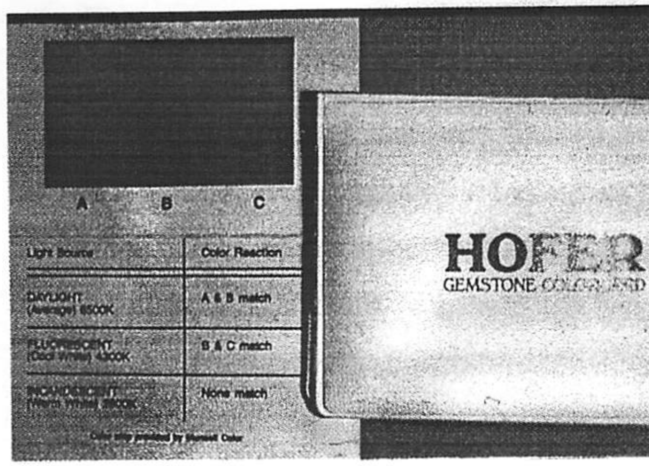

Fig. 1. Hofer Gemstone Colorcard. Left - Inside of folded card. Right - Vinyl carrying case.

The stated purpose of the Hofer Gemstone Colorcard is 'to rapidly identify which light source you are using for viewing colored gems'.

It (Fig. 1 - Left) consists of a folded 110x90 mm card on which three contiguous specially formulated blue-green Munsell colour chips (designated from left to right A, B & C), and a key to the colour reactions of these colour chips to the three commonly used light sources. Precise instructions for using the Colorcard, 'To identify any light source, notice which sections on the color chip (A/B/C) match or mismatch according to the key', are printed on the outside of the Colorcard.

HOW THE COLORCARD OPERATES

When the three contiguous blue-green colour chips are viewed in light sources, that vary in colour temperature from 2900 to 6500 K, neither the A or C colour chips appear to change colour. In contrast the red (wavelength) reflectance of the B colour chip does increase with decreasing colour temperature of the light source in which the chip is examined. Consequently, the B colour chip appears increasingly reddish grey when it is viewed in red-rich (lower colour temperature) light sources.

HOW TO USE THE COLORCARD

According to the Gemstone Colorcard's inventor, only the central (B) colour chip will change colour when it is viewed in either 2900 K 'warm white' light, 4300 K 'cool white light', or 6500 K 'average daylight'. These light sources were selected by Hofer to represent illuminants commonly used in the coloured stone or diamond industry. In contrast, when the A and C colour chips are examined under each of the chosen light sources, the A patch always remains greenish, while the C patch always remains bluish.

* The colour temperature of a light source is the temperature (in degrees Kelvin) derived by equating the colour (spectral distribution) of the light source to the colour of a black body radiator heated to a [colour] temperature necessary to produce that colour. (°K = °C + 273.2)

Postage Stamps Featuring Minerals

Stamps featuring four specimens from the Smithsonian Museum were released by the United States Postal Service in September. Only the second set ever issued featuring specimens from the museum, they show native copper, orange wulfenite, blue azurite and green variscite.

Therefore:

When A & B colour patches match, the light source has a colour temperature of 6500 K.

When B & C colour patches match, the light source has a colour temperature of 4300 K.

When no colour patches match, the light source has a colour temperature of 2900 K.

THE EVALUATION

Ten undergraduate students, with no previous gemmological or gem industry experience, were selected to participate in the first stage of this evaluation. Each student was given the Colorcard, and requested to carefully read its operating instructions. Students were then requested to use the Colorcard to determine the colour temperature of three Philips light sources that included: a 29 warm white (2900 K), a 37 special cool white delux (4200 K), and an 86 daylight (6500 K) fluorescent lamp.

Each student correctly identified the colour temperature of the three light sources, without appreciable difficulty.

In the second stage of the evaluation six gemmologists, one of whom was moderately blue-green colour blind, were requested to describe the colour/s of and match between the colour chips, and the colour of the surrounding white card, when the Colorcard was viewed under seven light sources of increasing colour temperature including a 40 W tungsten bulb (2650 K), a 10 W quartz-halogen bulb (3400 K), a white fluorescent tube (4100 K), a cool white fluorescent tube (4200 K), a daylight fluorescent tube (6500 K), a special daylight fluorescent tube (7400 K), and Australian south daylight (7500 K).

With increasing colour temperature of each light source gemmologists reported that the white card surrounding colour chips changed colour from yellowish orange to cream, to off white, white, then slightly bluish white. With respect to the observed colour of the Colorcard's colour chips: B & C almost matched (B being very slightly greyer than C) under white (4100 K) and cool white (4200 K) fluorescent tubes (4200 K); while A & B matched under the daylight fluorescent tube (6500 K). When the chips were viewed under both the special daylight fluorescent tube, and Australian south daylight, the B chip was slightly greener than the A chip.

Interestingly, the blue-green colour blindness of the one gemmologist seemed to have little influence over his accuracy of colour matching when using the Colorcard.

EXTENDED USEFULNESS

According to Stephen Hofer, with some experience responses of his Colorcard can be used to interpolate colour temperatures of light sources other than those of the 2900, 4300, and 6500 K light sources to which the Colorcard's blue-green colour chips were designed to be responsive.

Thus the colour temperatures of unknown light sources, ranging from 2900 to 7500 K, can be approximated by using the following patterns of colour matches/mismatches.

Light Source	Colour Reaction
7500 K	A & B nearly match (green), however B appears slightly greener than A.
6500 K	A & B match exactly (green)
6200 K	A & B match (B is very slightly bluish green)
5500 K	A & B match (B is slightly bluish green)
5250 K	A & B match (B is bluish green)
5000 K	A & B match (B is blue-green)
4300 K	B & C match exactly (blue)
4100 K	B & C nearly match (blue), however B has a tinge of red-grey and is reddish greyish blue
3500 K	None match, but the reddish grey of B is less than that observed under 2900 K illumination
2900 K	None match . . . A appears green . . . B appears reddish grey . . . C appears blue

In addition, experienced users of the Gemstone Colorcard will begin to notice colour temperature differences between light sources, when other contributing factors such as surrounding background colours of walls, ceilings etc., dirt, dust, and retinal fatigue are involved.

In supporting this statement Stephen Hofer noted that in the New York Diamond Dealers Club the lighting environment was fairly consistent on the main trading floor. However, light entering the room from windows toward the back on the left side was decidedly yellow (A & B match, yet B is blue green - 5,000 K). The logical explanation for this yellowishness is located across the road — for the windows of the Club face a large brick building that preferentially reflects yellow-red wavelengths. Thus a dealer trying to make the distinction between a D and E colour diamond may have difficulty under these conditions. Also, an observer of lower colour goods, on a yellowish stone paper, may think these diamonds have a better colour than they really do.

CONCLUSION

For $US 25, purchasers of the Hofer Gemstone Colorcard will obtain an inexpensive, readily portable device that will allow gemmologists, gem merchants, jewellers, or the buying public to simply determine the colour temperature of common natural or artificial light sources in which they may be required to either buy, purchase, or grade, diamonds or coloured stones.

This card does allow a practised user to precisely recognise common light sources having colour temperatures of 2900, 4300, and 6500 K. As well, interpolation of responses of the A, B & C colour chips will allow the colour temperature of any light source between 2900 and 7500 °K to be approximated.

The Hofer Gemstone Colorcard will prove to be a useful aid for those buying or selling diamonds or coloured stones.

ACKNOWLEDGEMENT

The authors wish to thank Stephen Hofer, for supplying the Colorcard for evaluation, as well as providing much useful technical information and advice. □