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BOOK REVIEW

GEMMOLOGY (third edition) by Peter G. Read. Elsevier, Amsterdam (2005) 324 pp., 272 figures, 27 tables, 11 color plates, U.S. $39.95 Softbound.

This textbook was developed to prepare students for the British Gemmological Association's Preliminary and Diploma Examinations. As such there are even examination notes contained in Appendix E of the book. However, the scope of this edition goes well beyond a simple preparatory manual for a gemmology examination. Many new additions are also present in this edition, including gemstone identification, simulants, and synthetics. References have been enhanced in this version and new sections addressing high-pressure, high-temperature (HPHT) diamond enhancement and Be lattice diffusion techniques for corundum have been included. In essence, this edition has been thoroughly updated and revised according to the author. In many sections, the text is technical to the point that it would be sufficient for a mineralogy undergraduate textbook.

The book consists of 20 chapters and 10 appendices. The introduction provides a fun-to-read chronology of the last 170 years of the quest for gemstones, the ability to create various synthetic stones, and the never-ending challenge of spotting and analyzing potential "fakes." This chapter also does a nice job of summarizing the three essential qualities of a gemstone: (1) beauty, (2) rarity (especially unusual optical properties), and (3) durability. The only minor problem found in this chapter is that some of the newest gem materials are noted (taaffeite, painite, and ekanite) but no chemical formulas are provided. The next nine chapters cover topics common to most mineralogy textbooks, however with a distinct slant toward gemology. These chapters include origin and occurrence of gemstones (chapter 2), basic chemistry (chapter 3) with a discussion of the relation between chemical composition and durability, and crystallography (chapter 4). The next chapter considers cleavage (chapter 5) and particular lapidary problems caused by cleavage fractures or parting. Hardness is reviewed in chapter 6 with special considerations given to gemology, such as diagnostic testing and specific mining techniques. Chapter 7 delves into specific gravity, density, and their use as diagnostic tools for gemstone identification. Color, luster, and sheen are discussed in chapter 8 with the intent of explaining their intrinsic value in gemstones. Reflection and refraction are covered in chapter 9 with a great deal of importance placed on refractive index determinations. A multitude of jewelers instruments that determine refraction or reflection properties are discussed here. Chapter 10 provides a concise description of polarization and pleochroism. Spectroscopy and various spectroscopic techniques used for identification of gemstones are covered in chapter 11.

It was the final nine chapters (12–20) that held the most interest for me as a person not involved in the gemstone business. The chapter on "Luminescent, electrical and thermal properties" (chapter 12) gave me new insights into how the gem trade uses ultraviolet and X-radiation as diagnostic tools, along with instruments for testing thermal conductivity of diamonds. Chapter 13 (Hand lens, microscope, and Chelsea filter) described two new techniques for a geologist. First was the Chelsea filter, developed to identify emeralds by matching the deep-red transmission and yellow-green absorption lines. Second was the handling with tweezers and packaging in "stone paper" of gemstones. Gemstone enhancement (chapter 14) was thoroughly enjoyable to read and gave a real appreciation of the extent to which people will go to improve "inferior" stones. This was especially apparent with diamonds, which are irradiated, subject to HPHT treatment, and even drilled with lasers to enhance clarity.

The next four chapters are great references on the subject of the identification of gemstones, synthetics, and simulants. Synthetic gemstones and simulants are described in chapter 15. This section covers many techniques including: the Verneuil flame fusion process, Czochralski method (crystal pulling from a melt), flux melt (commonly used for synthetic emeralds), as well as zone melting, hydrothermal, and chemical deposition (CDC) processes, diamond synthesis, diamond films, and composite gemstones. Chapter 16 provides a large array of methods for identifying inorganic gemstones and their synthetic counterparts while chapter 17 provides identification methods for inorganic gemstone simulants. Chapter 18 goes into elaborate detail on organic gem material (pearls, shell, amber, ivory, tortoiseshell, jet, and coral) and identification of their simulants. The design and cutting of gemstones is well summarized in chapter 19. There is great detail in explaining the "critical angle" that allows for a stone's total internal reflection, followed by six pages of descriptions and drawings of various diamond cuts. The chapter ends with details on diamond polishing methods and the various diamond grading standards used by different national gemologic institutes. Chapter 20 defines a practical guide to identifying gemstones along with a very useful flow chart. The chart starts with visual observation and moves to more analytical methods (in some cases) to provide a final identification.

Of the appendices, appendix F (gemstone constants) is extremely useful, followed by the combined appendices B–C, which give descriptions of the composition, varieties, constants, physical characteristics, and localities of organic and inorganic gemstones, respectively. Appendix D provides composition, constants, physical characteristics, and synthesis processes for man-made diamond simulants.

If there are any drawbacks to this text, they are minor and

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hardly detract from the large amount of fascinating information provided. Although the drawings and diagrams are clear and straightforward, many of the photographs are grainy and therefore lose some of the intended information. The only other potential shortfall is that the number of references in Appendix A could have been greatly expanded.

To summarize, this textbook will not only appeal to the aforementioned students preparing for the British Gemmological Association's Preliminary and Diploma Examinations, but to gemologists in general (especially the Gemological Institute of America), mineralogists, proficient jewelers, and anyone in the general population that has a love of gems.

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ERRATUM

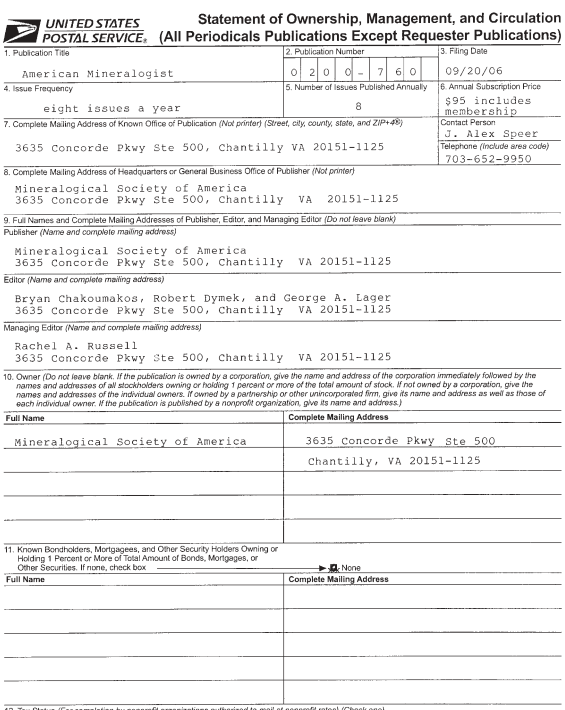
Icosahedral coordination of phosphorus in the crystal structure of melliniite, a new phosphide mineral from the Northwest Africa 1054 acapulcoite by Giovanni Pratesi, Luca Bindi, and Vanni Moggi-Cecchi (vol. 91, 451–454, 2006, DOI: 10.2138/am.2006.478).

Structure determination performed by us demonstrated that P atoms in melliniite are coordinated by 12 metal atoms in a somewhat distorted icosahedral arrangement, but our claim that melliniite is the first phase with so high a coordination number for phosphorus is not true. Sergey N. Britvin and Sergey V. Krivovichev (St. Petersburg State University) kindly pointed out to us that icosahedral coordination of phosphorus in phosphides has been known for at least 20 years. It has been observed, for instance, in the structures of $Mn_6Ni_{16}P_7$ (Chaudouet et al. 1983) and $MnNi_{1.7}P_{0.3}$ (Orishchin et al. 1985). However, it seems to be true that melliniite is the first natural phase with an icosahedral coordination of phosphorus and thus our suggestions about the role of phosphides as P reservoirs in deep planetary interiors are correct.

REFERENCES CITED

Chaudouet, P., Madar, R., and Fruchart, R. (1983) Etude de nouveaux pnictures ternaires de metaux de transition isostructuraux des phases G, $Ni_{16}Mn_6P_7$, $Ni_{16}Mn_6As_7$. Materials Research Bulletin, 18, 713–719.

Orishchin, S.V., Kuz'ma, Yu.B., and Shchebel', L.Yu. (1985) New phosphides with an icosahedral coordination of the phosphorus atom. Izvestiya Akademii Nauk SSSR, Neorganicheskie Materialy, 21, 1089–1092 (in Russian).



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