

## 1. Basics: a core collection on infrared spectroscopy

- \*A. L. J. Bellamy, *The Infrared Spectra of Complex Molecules*, 3rd ed., Vol. 1, Chapman and Hall, 1975. The best collection of infrared group frequencies.
- \*B. L. J. Bellamy, *The Infrared Spectra of Complex Molecules*, Vol. II, *Advances in Infrared Group Frequencies*, 2nd ed., Chapman and Hall, 1980. An extensive discussion of the factors that affect group frequencies.
- \*C. C. D. Craver (Ed.), *Coblentz Society Desk Book of Infrared Spectra*, 2nd ed., Coblentz Society, Kirkwood, MO. 540 pp. Useful introduction, with extensive bibliography. 900 high-quality reference spectra. Highly recommended.
- \*D. A. Lee Smith, *Applied Infrared Spectroscopy*, Wiley-Interscience, New York, 1979. 322 pp. Excellent.
- \*E. D. Lin-Vien, N. B. Colthup, W. G. Fateley, and J. G. Grasselli, *Handbook of Infrared and Raman Characteristic Group Frequencies*, Academic, New York, 1991. 503 pp. Excellent discussion of the two kinds of group frequencies. Also contains IR and Raman spectra of 111 compounds reproduced from several sources.
- \*F. W. J. Potts, *Chemical Infrared Spectroscopy*, Vol. 1, *Techniques*, Wiley, New York, 1963. 322 pp. Excellent.

## 2. General texts

- A. American Society for Testing and Materials (ASTM), Committee E-13, *Manual on Practices in Molecular Spectroscopy*, 4th ed., ASTM Philadelphia, PA, 1979. 162 pp.
- \*B. R. P. Bauman, *Absorption Spectroscopy*, Wiley, New York, 1962. 611 pp. Both theory and experiment.
- C. E. G. Brame and J. G. Grasselli (Eds.), *Infrared and Raman Spectroscopy* (3 parts), Decker, 1977. A series, with chapters on applications to textiles, foods, petroleum products, etc.
- \*D. N. B. Colthup, L. H. Daly, and S. E. Wiberly, *Introduction to Infrared and Raman Spectra*, 3rd ed., Academic, New York, 1990. 560 pp. General coverage, but particularly good for group frequencies and their physical interpretation.
- E. W. O. George and P. McIntyre, *Infrared Spectroscopy*, Wiley, New York, 1987. 560 pp.
- \*F. R. N. Jones and C. Sandorfy, Applications of Infrared and Raman Spectra in W. West (Ed.), *Chemical Applications of Spectroscopy*, Vol. IX in Weissburger's series *Technique of Organic Chemistry*, Interscience, New York, 1956. 334 pp.
- G. D. N. Kendall (Ed.), *Applied Infrared Spectroscopy*, Reinhold, 1966. 560 pp. Chapters by specialists.

## 3. Libraries of infrared reference spectra

- \*A. *Coblentz Society Spectra*, Coblentz Society, Kirkwood, MO. An extensive collection of critically evaluated spectra.



- B. D. Dolphin and A. E. Wick, *Tabulation of Infrared Spectral Data*, Wiley, New York, 1977. Tabulated band positions. Useful for unusual molecules.
- \*C. J. G. Grasselli and W. M. Ritchey (Eds.), *Atlas of Spectral Data and Physical Constants for Organic Compounds*, 2nd ed., CRC Press, Boca Raton, FL, 1975.
- \*D. D. Hummel. See Polymers and Coatings, Part 6.
- \*E. R. J. Keller, *The Sigma Library of FT-IR Spectra*, Edition I, Vols. 1 and 2, Sigma Chemical Co., St. Louis, MO, 1986. Over 10,000 spectra of compounds of biochemical interest, 4 per page. An extension of the Aldrich collection.
- F. R. W. A. Oliver and B. Marsden, A Bibliography of Published Collections of [Infrared] Spectral Data, *Eur. Spectrosc. News*, **33** 33–37 (1980). A very extensive bibliography, with a good index by chemical class. It is unfortunate that this journal is not widely available.
- \*G. Pachler, Matlok, and Gremlich, *Merck FT-IR Atlas*, VCH Publishers, New York, 1988. In German and English. 3050 spectra, three per page; well indexed.
- \*H. C. J. Pouchert (Ed.), *Aldrich Library of Infrared Spectra*, 3rd ed., Aldrich Chemical Co., Milwaukee, WI, 1981. 12,000 spectra in one volume, eight per page.
- \*I. *Sadtler Research Laboratories Spectra*, Sadtler Research Laboratories, Philadelphia, PA. The largest published collection.
- \*J. B. Schrader, *Raman/Infrared Atlas of Organic Compounds*, 2nd ed., VCH Publishers, New York, 1989. 1118 pp. Raman and IR spectra plotted on the same scale for about 1000 compounds. The spectra are large; they are vertical on the page, and each page has one pair of spectra. Very good.
- \*K. *Sprouse Collection of Infrared Spectra*, Elsevier Science, Journal Information Center, New York.
- 1) Book I, *Polymers*. 415 spectra.
  - 2) Book II, *Solvents by Cylindrical Internal Reflectance*, 1987. 776 pp. 350 spectra of a wide variety of liquids, well presented. Good indices. Very useful.
  - 3) Book III, *Surface Active Agents*.
4. Infrared group frequencies
- \*A. Bellamy, Vols. I and II. See Part 1.
- B. F. F. Bentley, L. D. Smithson, and A. L. Rozek, *Infrared Spectra and Characteristic Frequencies, 700–300 cm<sup>-1</sup>*, Interscience, New York, 1968.
- C. N. B. Colthup, Spectra-Structure Correlations in the Infra-Red Region, *J. Opt. Soc. Am.* **40**, 397–400 (June 1950). The original Colthup chart.
- \*D. Colthup, Daly, and Wiberly. See Part 2.
- \*E. Jones and Sandorfy. See Part 2.



- \*F. Lin-Vien, Colthup, Fateley, and Grasselli. See Part 1.
- G. R. C. Lord and F. A. Miller, Factors Influencing Characteristic Vibrational Frequencies of Molecules: Intramolecular Effects, *Appl. Spectrosc.* **10**, 115–123 (1956).
- H. K. Nakanishi, *Infrared Absorption Spectroscopy—Practical*, 2nd ed., Holden-Day, 1977. Contains a set of problems useful for self-instruction.

#### 5. Gases and vapors

- \*A. D. G. Erley and B. H. Blake, *Infrared Spectra of Gases and Vapors*, Vol. II, *Grating Spectra*, Chemical Physics Research Laboratory, Dow Chemical Company, Midland, MI, 1965. 132 spectra.
- B. D. G. Murcray and A. Goldman (Eds.), *CRC Handbook of High Resolution Infrared Library Spectra of Atmospheric Interest*, CRC Press, Boca Raton, FL, 1981.
- C. R. A. Nyquist, *The Interpretation of Vapor Phase Infrared Spectra*, Sadtler Research Laboratories. Vol. 1, *Interpretation*. Vol. 2, *Spectra*.
- D. R. H. Pierson, A. N. Fletcher, and E. S. C. Gantz, Catalog of IR Spectra for Qualitative Analysis of Gases, *Anal. Chem.* **28**, 1218 (1956). 66 spectra.
- E. Welti, *Infrared Vapour Spectra*, Heyden, 1970. 222 pp, 300 spectra.
- F. The Coblenz Society and Sadtler Research Labs. have collections of gas spectra.

#### 6. Polymers and coatings

- A. D. I. Bower and W. F. Maddams, *The Vibrational Spectroscopy of Polymers*, Cambridge University Press, 1992.
- \*B. Federation of Societies for Coatings Technology (FSCT), *An Infrared Spectroscopy Atlas*, FSCT, Philadelphia, PA, 1982, 896 pp. Text, 1400 spectra, 1500 references. Excellent.
- \*C. D. L. Harms, Identification [of Polymers] by Infrared Spectra of Their Pyrolysis Products, *Anal. Chem.* **25**, 1140–1155 (1953). 30 spectra.
- \*D. J. Haslam, H. A. Willis, and D. C. M. Squirrel, *Identification and Analysis of Plastics*, 2nd ed., Heyden, 1980. 748 pp, 296 spectra.
- E. J. C. Henniker, *Infrared Spectrometry of Industrial Polymers*, Academic, New York, 1967. 229 pp. Text only; no reference spectra.
- F. D. O. Hummel, *Infrared Spectra of Polymers in the Medium and Long Wavelength Regions*, Interscience, New York, 1966. 207 pp, 192 spectra.
- \*G. D. O. Hummel, *Atlas of Polymer and Plastics Analysis*, 3rd ed., Vol. 1, *Defined Polymers*, Carl Hauser Verlag, Munich. 1000 pp, 2809 spectra at 3 spectra/page. In English and German.
- \*H. D. O. Hummel and F. Scholl, *Atlas of Polymer and Plastics Analysis*, 2nd ed., Verlag Chemie International, New York, 1979. Three volumes:
  - 1) *Polymers: Structures and Spectra*.



2) *Plastics, Fibres, Rubber, Resins.*

3) *Additives and Processing Aids.*

Very good.

- I. W. J. Irwin, *Analytical Pyrolysis. A Comprehensive Guide*, Dekker, 1982.
- J. R. E. Kagarise and L. A. Weinberger, *Infrared Spectra of Plastics and Resins*, NRL Report 4369, Naval Research Laboratory, Washington, DC, 1954. PB 111438. Obtainable from National Technical Information Service, Dept. of Commerce, Springfield, VA. 57 spectra.
- K. S. S. Stimler and R. E. Kagarise, same title, *Part 2. Materials Developed Since 1954*, NRL Report 6392, Naval Research Laboratory, Washington, DC, 1962. AD 634427. 46 spectra.
- L. D. S. Cain and S. S. Stimler, same title, *Part 3. Related Polymeric Materials (Elastomers)*, NRL Report 6503, Naval Research Laboratory, Washington, DC, 1967. AD 649004. 47 spectra.
- M. D. N. Kendall, chapter on plastics. See Part 2.
- \*N. J. L. Koenig, *Spectroscopy of Polymers*, American Chemical Society, Washington, DC, 1991. 328 pp. Includes IR, Raman, and NMR spectra.
- O. R. A. Nyquist, *Infrared Spectra of Plastics and Resins*, Chemical Physics Research Laboratory, Dow Chemical Co., Midland, MI, 1961. 125 spectra.
- P. P. C. Painter, M. M. Coleman, and J. L. Koenig, *The Theory of Vibrational Spectroscopy and Its Application to Polymeric Materials*, Wiley-Interscience, New York, 1982.
- Q. H. W. Siesler and K. Holland-Moritz, *Infrared and Raman Spectroscopy of Polymers*, Dekker, 1980. 400 pp.
- R. W. C. Wake, *Analysis of Rubber and Rubber-Like Polymers*, 1st ed., Wiley-Interscience, New York, 1958. Discusses pyrolysis. In 2nd ed. (1969) reference spectra are not given.
- S. R. Zbinden, *Infrared Spectroscopy of High Polymers*, Academic, New York, 1964.
- T. M. V. Zeller and S. C. Pattacini, *The Infrared Grating Spectra of Polymers*, Perkin-Elmer Corp., Norwalk, CT, 1975. Application Note #13. 29 spectra.
- U. The Coblenz Society and Sadtler Research Labs. have extensive collections of polymer spectra. See Part 3.
7. Inorganics and organometallics
- A. D. M. Adams, *Metal-Ligand and Related Vibrations*, Edward Arnold, London, 1967. 379 pp.
- B. L. C. Afremow and J. J. Vandenberg, High Resolution Spectra of Inorganic Pigments and Extenders in the Mid-Infrared Region from 1500 to 200  $\text{cm}^{-1}$ , *J. Paint Technol.* **38**, 169–202 (1966). 78 spectra.
- C. V. C. Farmer, *Infrared Spectra of Minerals*, Mineralogical Society, London, 1974. 590 spectra.



- D. J. R. Ferraro, *Low Frequency Vibrations of Inorganic and Coordination Compounds*, Plenum, New York, 1971. ca. 300 pp.
- E. J. R. Ferraro (Ed.), *The Sadtler Infrared Handbook of Minerals and Clays*, Sadtler Research Laboratories, Philadelphia, PA, 1982.
- F. J. A. Gadsden, *Infrared Spectra of Minerals and Related Inorganic Compounds*, Butterworths, 1975. 277 pp.
- G. N. N. Greenwood and E. J. F. Ross, *Index of Vibrational Spectra of Inorganic and Organometallic Compounds*, Butterworths.
- 1) Vol. 1, 1972. Covers 1935–1960. 762 pp.
  - 2) Vol. 2, 1975. Covers 1961–1963. 916 pp.
  - 3) Vol. 3, 1977. 1616 pp.
- H. F. R. Haba and C. L. Wilson, *Talanta* **11**, 21–26 (1964). A scheme for the IR identification of polyatomic negative ions. Uses a preliminary separation.
- I. J. M. Hunt, M. P. Wisherd, and L. C. Bonham, *Anal. Chem.* **22**, 1478 (1950). Spectra of about 60 minerals. Be careful using these. Their procedure to sort by particle size sometimes fractionated the samples.
- J. C. Karr, Jr. (Ed.), *Infrared and Raman Spectroscopy of Lunar and Terrestrial Materials*, Academic Press, New York, 1975. Text and references; very few spectra.
- K. J. R. Lehr, et al., *Crystallographic Properties of Fertilizer Compounds*, National Fertilizer Development Center, Muscle Shoals, AL, Chemical Engineering Bulletin No. 6, May 1967. 207 infrared spectra, 4000–400  $\text{cm}^{-1}$ , of well-characterized nitrates, phosphates, carbonates, etc.
- L. E. Maslowsky, *Vibrational Spectra of Organometallic Compounds*, Wiley, New York, 1977. 1380 tabulated spectra. 124 plotted.
- M. F. A. Miller, G. L. Carlson, F. F. Bentley, and W. H. Jones, *Infrared Spectra of Inorganic Ions in the Cesium Bromide Region (700–300  $\text{cm}^{-1}$ )*, *Spectrochim. Acta* **16**, 135–235 (1960). An extension of the next paper.
- \*N. F. A. Miller and C. H. Wilkins, *Infrared Spectra and Characteristic Frequencies of Inorganic Ions*, *Anal. Chem.* **24**, 1253–1294 (1952). 160 reference spectra, linear in micrometers 4000–650  $\text{cm}^{-1}$ .
- O. H. Moenke, *Mineralspektren*, Akademie-Verlag, Berlin, 1962. 343 spectra.
- P. K. Nakamoto, *Infrared and Raman Spectroscopy of Inorganic and Coordination Compounds*, 4th ed., Wiley, New York, 1986. 484 pp.
- \*Q. R. A. Nyquist and R. O. Kagel, *Infrared Spectra of Inorganic Compounds (3800–45  $\text{cm}^{-1}$ )*, Academic, New York, 1971. 495 pp. About 900 spectra of high quality. An excellent collection, IR only.
- \*R. R. A. Nyquist, R. O. Kagel, C. L. Putzig, and M. A. Luegers, *The Handbook of Infrared and Raman Spectra of Inorganic Compounds and Organic Salts*, 4 vols., Academic, New York, 1996. The best collection available as of 12/98. This is available on CD-ROM.
- S. S. D. Ross, *Inorganic Infrared and Raman Spectra*, McGraw-Hill, New York, 1972. 414 pp.



T. J. W. Salisbury, L. S. Walter, N. Vergo, and D. M. D'Aria, *Infrared (2.1–25  $\mu\text{m}$ ) Spectra of Minerals*, Johns Hopkins University Press, Baltimore, MD, 1991. Spectra in transmittance (KBr disks), specular reflection, and diffuse reflection for 130 carefully characterized minerals. Typically 4 spectra/mineral, but linear in micrometers. Numerical data on a CD-ROM included.

U. H. W. van der Marel and H. Beutelspacher, *Atlas of Infrared Spectroscopy of Clay Minerals and Their Admixtures*, Elsevier, 1976. 1180 spectra.

#### 8. Biochemical, drug, and forensic applications

A. Association of Official Analytical Chemists (AOAC), *Infrared and Ultraviolet Spectra of Some Compounds of Pharmaceutical Interest*, AOAC, Washington, DC, 1972.

B. R. W. Hannah and S. C. Pattacini, *The Identification of Drugs from Their Infrared Spectra*, Applications Study #11, Perkin-Elmer Corp., Norwalk, CT, 1972.

C. J. Holubeck and O. Strouf, *Spectral Data and Physical Constants of Alkaloids*, Heyden, 1965.

D. *Infrared Absorption Spectra of Steroids, An Atlas*, Interscience, New York.

1) Vol. I, Dobriner, Katzenellenbogen, and Jones, 1953.

2) Vol. II, Roberts, Gallagher, and Jones, 1958.

E. H. H. Mantsch and Dennis Chapman (Eds.), *Infrared Spectroscopy of Biomolecules*, Wiley-Liss, New York, 1996. 359 pp.

F. M. J. Maunder, *Practical Hints on Infrared Spectrometry from a Forensic Analyst*, Adam Hilger, London, 1972.

G. T. Mills III and J. Conrad Roberson, *Instrumental Data for Drug Analysis*, CRC Press, Boca Raton, FL, 1993. 7 volumes covering IR, NMR, UV, and other data. Especially Vols. 1–4 for IR spectra.

H. A. C. Moffat (Senior Ed.), *Clarke's Isolation and Identification of Drugs*, Pharmaceutical Press, London, England. In the U. S.: Rittenhouse Book Distributors, King of Prussia, PA, 1986. About 500 IR spectra of drugs.

I. F. S. Parker, *Applications of Infrared Spectroscopy in Biochemistry, Biology, and Medicine*, Plenum, New York, 1971.

#### 9. Other classes of compounds

##### A. Essential oils

1) J. Bellanato and A. Hidalgo, *Infrared Analysis of Essential Oils*, Heyden, 1971. 164 pp., 214 spectra.

2) W. W. Morris, High Resolution Infrared Spectra of Fragrance and Flavor Compounds, *J. Assoc. Off. Anal. Chem.* **56**, 1027 (1973).

3) J. A. Wenninger, R. L. Yates, et al., High Resolution Infrared Spectra of Some Naturally Occurring Sesquiterpene Hydrocarbons.



- a) *I. J. Assoc. Off. Anal. Chem.* **50**, 1313–1335 (1967).
  - b) *II. Ibid.*, **53**, 949 (1970).
  - 4) See also: a) Kendall, pp. 285–311. See Part 2.  
b) Sadtler collection.
- B. Isotopically labeled compounds
- 1) S. Pinchas and I. Lauicht, *Infrared Spectra of Labelled Compounds*, Academic, New York, 1971. 371 pp.
  - 2) Numerous papers by K. Nakamoto on compounds with isotopes of Fe, Mn, and other metals
- C. Silicones
- 1) E. D. Lipp and A. Lee Smith, Silicones: Infrared, Raman, Near-Infrared, and Ultraviolet Spectra, in A. L. Smith (Ed.), *The Analytical Chemistry of Silicones*, Wiley-Interscience, New York, 1991, Chapter 11, pp. 305–345. Has several labeled IR spectra.
- D. Organophosphorus compounds
- 1) R. A. Nyquist and W. J. Potts, Jr., Analytical Chemistry of Phosphorus Compounds, in M. Halman (Ed.), *Chemical Analysis Series*, Wiley-Interscience, New York, 1972, pp. 169–293, Chapter 5.
  - 2) J. V. Pustinger, Jr., W. T. Cave, and M. L. Nielsen, Infrared Spectra of Inorganic Phosphorus Compounds, *Spectrochim. Acta* **15**, 909–925 (1959). 57 spectra.
  - 3) L. C. Thomas, *Interpretation of the Infrared Spectra of Organophosphorus Compounds*, Heyden, ca. 1975. 257 pp.
- E. Pesticides
- 1) R. C. Gore, R. W. Hannah, S. C. Pattacini, and T. J. Porro, Pesticide Residues: Infrared and Ultraviolet Spectra of 76 Pesticides, *J. Assoc. Off. Agric. Chem.* **54**, 1040–1082 (1971).
  - 2) W. M. Morris, Jr., and E. O. Haenni, Infrared Spectra of Pesticides, *J. Assoc. Off. Agric. Chem.* **46**, 964–992 (1963). 40 spectra.
  - 3) T. Visser, *Infrared Spectra of Pesticides*, Marcel Dekker, New York, 1993. 440 pp, over 400 spectra.
- F. Propellants and explosives
- 1) F. Pristera and W. Fredericks, *Compilation of Infrared Spectra of Ingredients of Propellants and Explosives*, U.S. Army Munitions Command, Picatinny Arsenal, Dover, NJ, 1965.
  - 2) F. Pristera et al., *Anal. Chem.* **32**, 495–508 (1960). 68 spectra.
- G. Simpler molecules, fundamental frequencies for
- \*1) T. Shimanouchi, Tables of Molecular Vibrational Frequencies.
    - a) Consolidated Volume I, SD Catalog No. C13, 48:39, U.S. Government Printing Office, Washington, DC, 1972.
    - b) Part 5. *J. Phys. Chem. Ref. Data* **1**, 189–216 (1972). Reprint No. 5.
    - c) Part 6. *Ibid.* **2**, 121–162 (1973). Reprint No. 21.
    - d) Part 7. *Ibid.* **2**, 225–256 (1973). Reprint No. 25.
    - e) Part 8. *Ibid.* **3**, 269–306 (1974). Reprint No. 49.



## 10. Surface studies

- A. M. L. Hair, *Infrared Spectroscopy in Surface Chemistry*, Dekker, 1967. 315 pp.
- B. L. H. Little, *Infrared Spectra of Adsorbed Species*, Academic, New York, 1966. 428 pp.
- C. W. Suëtaka, *Surface Infrared and Raman Spectroscopy*, Plenum, New York, 1995. 270 pp.
- D. J. T. Yates, Jr., and T. E. Madey (Eds.), *Vibrational Spectroscopy of Molecules on Surfaces*, Plenum, New York, 1987. 484 pp.
- E. There are many papers on this subject.

## 11. Near-infrared spectra

- A. W. Kaye, Near Infrared Spectroscopy. I. Spectral Identification and Analytical Applications, *Spectrochim. Acta* **6**, 257–287 (1954).
- B. W. Kaye, Near Infrared Spectroscopy. II. Instrumentation and Technique, *Spectrochim. Acta* **7**, 181–204 (1955).
- C. O. H. Wheeler, Near Infrared Spectra of Organic Compounds, *Chem. Rev.* **59**, 629–666 (1959).
- D. There are many papers since 1980 on quantitative analysis by near IR spectroscopy.

## 12. Far-infrared spectra

- A. A. Finch, P. N. Gates, K. Radcliffe, F. N. Dickson, and F. F. Bentley, *Chemical Applications of Far Infrared Spectroscopy*, Academic, New York, 1970. 277 pp.
- \*B. K. D. Möller and W. G. Rothschild, *Far Infrared Spectroscopy*, Wiley-Interscience, New York, 1971. 796 pp.

## 13. Instrumentation and techniques

- \*A. A. R. H. Cole (for IUPAC), *Table of Wavenumbers for the Calibration of Infrared Spectrometers*, 2nd ed., Pergamon, New York, 1977.
- B. P. B. Coleman et al., *Practical Sampling Techniques for Infrared Analysis*, CRC Press, Boca Raton, FL, 1993. 301 pp.
- C. J. R. Ferraro and K. Krishnan, *Practical Fourier Transform Infrared Spectroscopy*, Academic, New York, 1990. 534 pp.
- \*D. N. J. Harrick, *Internal Reflection Spectroscopy*, Wiley-Interscience, New York, 1967. Obtainable from Harrick Scientific Corp., Croton Dam Road, Box 867, Ossining, NY 10562.
- \*E. P. R. Griffiths and J. A. deHaseth, *Fourier Transform Infrared Spectrometry*, Wiley, New York, 1986. 656 pp.
- F. H. J. Humecki (Ed.), *Practical Guide to Infrared Microspectroscopy*, Marcel Dekker, 1995. 488 pp. 12 chapters by various authors.
- G. G. W. J. Irwin, *Analytical Pyrolysis. A Comprehensive Guide*, Dekker, 1982.
- H. R. G. Messerschmidt and M. A. Harthcock, *Infrared Microspectroscopy*, Dekker, 1988. 312 pp.
- I. Potts. See Part 1.



J. W. J. Potts, Jr., and A. L. Smith, Optimizing the Operating Parameters of Infrared Spectrometers, *Appl. Opt.* **6**, 257–265 (1967).

\*K. Smith. See Part 1.

\*L. A. L. Smith, Trace Analysis by Infrared Spectroscopy, in G. D. Christian and J. B. Callis (Eds.), *Trace Analysis: Spectroscopic Methods for Molecules*, Wiley, 1986, pp. 175–284. Excellent.

M. R. A. Spragg, A Rapid Sample Preparation Technique for Diffuse Reflectance Measurements, *Appl. Spectrosc.* **38**, 604–605 (1984). Describes his method of rubbing a hard polymer on SiC paper.

#### 14. Miscellaneous infrared topics

A. Coblenz Society Specifications for Evaluation of Infrared Spectra.

1) *Anal. Chem.* **38**, 27A (No. 9, 1966).

2) *Anal. Chem.* **47**, 945A (Sept. 1975). Class II spectra.

B. E. R. Lippincott, The Limitations and Advantages of Infrared Spectroscopy in Patent Problems, *J. Patent Office Soc.* **45**, 380 (1963).

#### 15. Raman spectroscopy

\*A. F. R. Dollish, W. G. Fateley, and F. F. Bentley, *Characteristic Raman Frequencies of Organic Molecules*, Wiley, New York, 1974. 443 pp, 108 spectra. The best book to date on this subject.

B. S. K. Freeman, *Applications of Laser Raman Spectroscopy*, Wiley, New York, 1974. Applications to organic chemistry only.

C. J. G. Grasselli and B. J. Bulkin (Eds.), *Analytical Raman Spectroscopy*, Wiley, New York, 1991. 400 pp. Chapters by various authors.

\*D. J. G. Grasselli, M. K. Snavely, and B. J. Bulkin, *Chemical Applications of Raman Spectroscopy*, Wiley-Interscience, New York, 1981. 198 pp. Excellent.

E. P. Hendra, C. Jones, and G. Warnes, *Fourier Transform Raman Spectroscopy. Instrumentation and Chemical Applications*, Ellis Horwood, New York, 1991. 311 pp.

\*F. Schrader. See Part 3.

G. D. P. Strommen and K. Nakamoto, *Laboratory Raman Spectroscopy*, Wiley, New York, 1984. 138 pp.

H. H. Szymanski (Ed.), *Raman Spectroscopy. Theory and Practice*, Plenum, New York.

1) Vol. 1, 1967. 255 pp. Contains some excellent chapters, especially the introductory one by L. A. Woodward.

2) Vol. 2, 1970. 221 pp.

I. See also Part 2.

J. There are many more references on Raman spectroscopy.