

Scholarly Communication in Chemistry
Searching with SciFinder Scholar

1. Scope of Chemistry is huge
 - Biochemistry 34%
 - Organic Chemistry 9%
 - Analytical Chemistry
 - Inorganic Chemistry
 - Physical Chemistry

} 27%

 - Applied Chemistry and Chemical Engineering 21%
 - Macromolecules 9%

2. What Chemists Do
 - Make things – perform syntheses or reactions
 - reactants, catalysts, products, by-products
 - reaction conditions
 - yields
 - Analyze things – tear things up
 - Separation techniques
 - Spectra techniques

3. Context of Instrumental Analysis within the discipline
instrumental analysis ~ analytical chemistry ~ constitutional chemistry

4. Agents that act on scientific information
 - Universities *Science is expensive -*
 - Corporations *Why do we do it?*
 - Government *How do we do it?*
 - Grants
 - Tenure
 - Peer review
 - Media
 - Professional associations

5. Types of Scientific Information

→ *Quick brainstorming session*

idea
research
laboratory notebook
letters to colleagues, in house
research reports for in house use
reports for gov't sponsored research
patent applications/patents
conversations, meetings in halls
email
web page
oral presentation at prof. meeting or trade assoc.
poster sessions
journal articles
preprints
announcements of publications/patents by alerting service
abstracting and indexing tools
review articles
monographs
edited volumes
encyclopedias
dictionaries
handbooks
citations in literature
dissertations/theses
treatises
directories
trade literature
manufacturer's technical literature
communication or letter
note (short paper)
literature review

then,

Read aloud quotes from Merton I.

5a. About Patents

Published 18 months after filing

Intellectual property (can be licensed, sold, exchanged, given away)

To get a patent, inventor is required to:

- Describe the invention in a manner sufficient for others to practice the invention
- Must be new or novel, be useful, and be non-obvious
- Patents generally good for 17 years

Can patent:

- A process
- A machine
- A manufactured product
- A composition of matter

Within Chemistry that means patents can protect:

- A compound (specific, class, or group)
- A composition containing the compound
- An article made from the compound
- A process for preparing the compound
- A method for using the compound for a specific purpose

Patents must contain:

- A written description of the invention
- A description must be sufficient that any one skilled in the art is able to make and use - this is like the "materials and methods" section of a journal article
- A description of the best mode for carrying out the invention
- An abstract of the invention described in the patent
- At least one claim of what it is/does/is good for clearly stated

Patents also contain a review of the "Prior Art". Prior Art is like a literature review citing references that were important in the development of the patent. This section can lead a researcher to useful articles.

6. Primary literature

- The first place a scientist will reveal, in a publicly accessible document or account, the results of a scientific investigation
- Most are peer-reviewed
 - Scientific journal articles
 - Conference proceedings
 - Technical reports (gov't, NTIS) National Technical Information Service
 - Dissertations/theses
 - Patents (they review prior art)
 - Preprints
- There are different types of journals
 - General news “magazines”
 - *Scientific American*
 - *Discover*
 - News journals
 - *Science*
 - *Nature*
 - Primary research journal (can be general or specialized)
 - *JACS*
 - *Analytical Chemistry*
 - Journals for rapid communication
 - *Chemical Communications*
 - *Tetrahedron Letters*
 - Review journals (secondary source)
 - *Chemical Reviews*
 - *Trends in Biochemical Sciences*
 - Trade journals or newsletters
 - *Chemical & Engineering News*
 - *Chemistry & Industry*

7. Secondary Literature

- Gathers information and facts from primary works
- Authors re-package and better organize the new information that was reported in the primary literature
- Points to or summarizes primary work
 - indexing and abstracting tools – pub in days to weeks after event
 - monographs – 1 to many years after event
 - lit reviews – 1-3 years after event

- 2 – 5 years after event
- dictionaries – quick facts
 - encyclopedias – quick access to essential facts fit into a general framework that relates the facts to other concepts. Includes a bibliography
 - handbooks - quick facts, physical property data
- other secondary works
 - directories
 - buyers guides
 - biographical works
 - Secondary literature generally will include the most important developments in a discipline
 - Will presume subject knowledge of the reader
 - Even with current year publication, information will be several years old
 - General concepts and subjects contained in dictionaries, encyclopedias, and textbooks
 - More in-depth information contained in monographs and treatises
 - Monographs – books written on a fairly narrow topic
 - Meant to be authoritative
 - Written by one or more authors
 - Treatise
 - Multi-volume set of books
 - Authoritative exposition of a topic
 - Designed to be used by experts in a field
 - Presumes subject knowledge in the discipline
 - Arranged in logical order, not alpha order
 - Volumes published over a number of years
 - Indexes printed after the set is complete (browsing access)
 - *Treatise in Analytical Chemistry*
13 volumes, 1978-1984

8. Flow of Scientific Information

→ [Handout Waterloo web page](#)

→ [Discuss the flow and the process works](#)

9. Role of the Professional Society

- Gutenberg and printing (1450's)
 - Print, circulate, and stabilize knowledge
 - Circulation of images (cartography, anatomy)
 - Rise of Protestant Europe as scientific powers in 1600's because Catholics censored heavily
 - Catholics, like Galileo, did not publish in Italy (catholic country). They published in places like Dutch city of Amsterdam because of its relative freedom to publish
 - By the end of 1600's it was possible for a scientist to derive significant income for published works
 - Priority became an issue (scientific claims, fame, and fortune)
- *Transactions of the Royal Society*
 - Moved scientists from a tradition of secrecy and insularity to open disclosure in exchange for notoriety
 - "Coin of the Realm" became public recognition of one's scientific contributions by qualified peers

→ Assign Reading p.619 Merton II

10.. Evolution of Professional Societies in Chemistry

1662 Royal Society of London for Improving Natural Knowledge

- 1st enduring public organization devoted to scientific research
- institutionalized non-sectarian science
- held rights under British law to:
 - correspond with foreigners
 - license books for publication
 - to hold property (museum and archives)
- money was always a problem – no royal sponsorship, just expected rich people (members, alumni) to give
- meetings involved experiments, dissections, demonstrations, reading of papers describing natural phenomena and describing experiments held elsewhere

→ Discuss Philosophical Transactions and JStor

1666 Royal Academy of Sciences – France

1841 Chemical Society of London formed and split away from Royal Society

- chemistry was the last specialty to branch off
 - Botany – 1788; Astronomy – 1820; Geological Society; Geographical Society
 - They were formed to accomplish special collaborative projects

- Since mid 1700's there was debate over whether chemistry should be based on theory or practice; this led to recognition as a university subject
 - Began publishing *Memoirs*, *Proceedings*, and *Chemical Society Journal*
- 1841 Pharmaceutical Society of Great Britain formed
- 1848 American Association for the Advancement of Science (AAAS) formed
- Covered all the sciences; functioned well
 - America was too large, chemical community too small and dispersed to support a national chemical society
- 1857 Societe de Chimie in Paris
- 1866 German Chemical Society formed in Berlin
- 1866 Russian Chemical Society
- 1874 Society of Public Analysts (food adulteration issues)
- Published *The Analyst* 1877 –
- 1876 American Chemical Society formed
- A political move to prevent formation of more powerful regional societies
- 1881 Society of Chemistry and Industry
- 1884 Society of Dyers and Colourists
- 1893 *JACS* first published
- 1903 Faraday Society founded (electrochemistry)
- 1907 Chemical Abstracts published by ACD
- 1942 Chemical Institute of Canada founded
- 1972 British Chemical Society
- Royal Institute of Chemistry
- Society for Analytical Chemistry
- Faraday Society
- } Formed the Chemical Society
- 1980 Chemical Society became the Royal Society of Chemistry

11. Role of the ACS – a gatekeeper

- Major publisher
- Major database and index provider
- Professional meetings
- Education (ex. ACS major)
 - *handout ACS List of recommended journals for college libraries*
- Ethical standards
 - *handout Chemist's Code of Conduct*

ACS Mission Statement:

Mission of the ACS is to encourage in the broadest and most liberal manner the advancement of the chemical enterprise and its practitioners. Toward that end, ACS advances scholarly knowledge, provides the profession service support, communicates with varied audiences, and is actively involved in the science, education, and public arenas.

- 30 journals, 3 magazines
- most cited journals in chemistry

2000 Journal Citation Reports

- ACS journals cited 722,800 times
- ACS journals ranked 1, 2, or 3 in 18 of 23 subject categories
- Citations increased 84% from 1999 to 2000
- JACS cited 118,117 times in 2000

ACS Journals #1 in respective fields:

Analytical Chemistry

Chemical Reviews

Environmental Chemistry

Inorganic Chemistry

Journal of Agricultural and Food Chemistry

JACS

Macromolecules

Journal of Organic Chemistry

Journal of Physical Chemistry

Searching the Chemical Literature

- Start with a current article and work backwards
 - Citation pearl growing
 - Writers always place their work in the context of work that has been done earlier
 - Articles contain lots of good references
 - Quickly see that some articles are frequently cited within your particular area of study
- Science always builds on earlier work

General Strategy

- Realize that searching the literature may mean looking for a variety of different kinds of information sources
 - May have to use SciFinder and CONSORT and encyclopedia
- Focus your topic and develop a list of keywords or phrases that describe it
- Ask your colleagues (i.e. professor) if they can recommend the name of anyone who is currently working in the field (flatters the person you ask)
- Decide what types of information you think you need; is there a specific time period
- Go basic first – secondary literature for background
- Keep track of what you find and where and how you found it so that you:
 - Won't repeat your work needlessly
 - So you can re-create your search if necessary
- Don't try to do everything at once – research is an iterative process
 - When you get a few good articles, start reading and see where they lead you
- Plan a schedule, allow enough time
- Know where to stop; the point of diminishing returns

Chemical Abstracts

- Selectively Indexes 98% of all chemical research articles and other relevant info published throughout the world
- Indexes keywords, patent #'s, and authors

Scenarios for SciFinder Scholar Session

1. "testing money for drugs"
 - refine "analysis"; refine CAPlus
 - compare with
 - "forensis analysis of money"
 - "cocaine on money"
 - "analysis pf money for drugs"
2. "fiber analysis and vegetable oils"
 - compare with
 - "identification of oil stians"
 - "identification of vegetable oil stains"
 - "analysis of vegetable oil stains on fiber"
3. "instrumental analysis of herbal medicine"
 - refine "chinese"
4. "testing for explosives residues on baggage"

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