Accessing industrial fire and explosion information in the CA files on STN*

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Abstract

Access to chemical safety information such as information on fires, explosions, nuclear reactor accidents, and occupational health hazards appearing in *Chemical Abstracts* is available in the CAS files through STN International, the scientific and technical information network. The CAS files include: the Registry File, containing more than twelve million compounds searchable by name and by structure; the CA File, containing more than ten million citations for retrieving bibliographic information, abstracts, and index entries; the CAOLD File, containing records for pre-1967 references; and CApreviews, containing records with bibliographic information and abstracts for references that will appear in the CA File. Anyone with a terminal capable of connecting with a telecommunication network is able to search STN.

1. Introduction

A major problem facing scientists worldwide is keeping up with the enormous amount of information in their fields of interest. It would be a formidable task just to read the journals that cover health and safety.

Since 1907, Chemical Abstracts Service (CAS) has been providing a means of locating information in the chemical and chemical engineering areas worldwide. The best known publication is *Chemical Abstracts* (CA), a comprehensive compilation of abstracts with detailed semiannual indexes.

In the first year of publication, 1907, *Chemical Abstracts* published 12,000 abstracts. Today, CAS produces approximately 530,000 abstracts per year. Just to browse through this printed information would be an overwhelming task. There is an easier way.

Access to chemical safety information appearing in the printed CA is available through CAS files on STN International, the scientific and technical

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information network. Scientists around the world can link their terminals to STN computers over telephone lines and search files of information on more than twelve million chemical substances and more than ten million scientific papers and patents published since 1967.

2. The CA File

The CA File contains, in a single file, all of the computer-readable contents of *Chemical Abstracts* from 1967 to the present. The CA File contains more than ten million citations; 20,000 records are added every two weeks. Documents are selected from more than 9,000 journals, technical reports, and conference proceedings covering chemistry and chemical engineering from 162 countries. More than 1.6 million patents from 26 countries and two international intellectual property organizations are processed.

The term "documents" refers not only to journal articles, books, patents, and dissertations, but also includes letters to the editor such as those appearing in *Chemical & Engineering News*. The health and safety information in these documents need not be the topic of primary importance; a statement within a document such as "the reaction was run at 480 °C to prevent explosion" is sufficient to warrant an abstract, keywords, and volume index entries on the safety aspects.

Here is the online record of a letter in *Chemical & Engineering News* on the explosion of nopinone during synthesis.

L1	ANSWER 1 OF 2 COPYRIGHT 1992 ACS
AN	CA114(16) : 149283z
TI	Synthesis of nopinone
AU	Ferreira, Jose Tercio B.
CS	Univ. Sao Carlos
LO	Brazil
SO	Chem. Eng. News, 68 (50), 4
SC	59-5 (Air Pollution and Industrial Hygiene)
DT	J
CO	CENEAR
IS	0009-2347
PY	1990
LA	Eng
AB	Explosions may occur in synthesis of nopinone on a large scale. β-Pinene samples (each 45 mmol) were ozonized in $CH_2Cl_2/MeOH$. The 4 samples were combined and cooled and AcOH and Zn were added to decomp. the ozonide. The soln. was concd. and stored in a freezer. A violent explosion occurred when this combined sample was warmed to room temp.
KW	nopinone synthesis explosion hazard; safety nopinone synthesis
IT	Explosion (hazard of, in nopinone synthesis)
IT	Hygiene (industrial, in nopinone synthesis, explosion hazard in relation to)
IT	24903-95-5P, Nopinone (synthesis of, explosion hazard in)

The online record consists of the bibliographic information, abstract, keywords, and index entries.

The field codes for the bibliographic information include:

AN = the CA Accession Number
TI = Title
AU = Author
CS = Corporate Source
SC = CA Section Code and Title
DT = Document Type
CO = Coden
IS   = ISSN (International Standard Serial Number)
PY = Publication Year
LA = Language

The abstract (AB field) is a findings-oriented summary of the original document, reporting the basic informational content of the document. Its primary purpose is to provide, accurately and quickly, sufficient information on the chemical content of the document abstracted to allow the searcher to determine if it is necessary to consult the original publication for complete details. All words in the abstract are searchable.

Keywords (KW), also searchable, are made up of one to six words selected by the analyst primarily from the document title and abstract, and hence reflect the author's terminology. In general, no attempt is made to standardize terminology in keywords. Keywords for safety-related documents do contain one controlled vocabulary term, and that is the term "safety". Since 1973, CA has collected studies relevant to laboratory and industrial safety at this keyword. The keyword safety is made for documents that deal with fires, explosions, implosions, and accidents as an additional point of access to this type of information.

Thus, for this document, "Synthesis of nopinone", safety is part of the keyword phrase, safety nopinone synthesis, making it possible to access this paper under the term "safety".

The indexing terms (IT field) for this document are: Explosion, Hygiene, and the CAS Registry Number for nopinone followed by a P, which means preparation.

Index entries, which are made by the document analyst at the same time that the abstracting and keywording are done, cover information from the entire document and appear as part of the CA File. Chemical substance index entries are made for specific chemical compounds that are new or have new data reported about them in a given document. General Subject Index entries are made for chemical properties, reactions, classes of substances, and biochemical concepts. Unlike the natural-language keywords, the index terms are controlled vocabulary. In addition, the depth of indexing is greater than in keyword indexing.

The text modification for the index entries consists of one or more phrases giving information found in the original document that pertains to the heading under which it appears. By providing details about the type of study involved, the text modification expands the information given in the heading and assists the searcher in determining whether or not the document contains data of interest. All words in the text modification are also searchable.

Thus, the CA File records contain words from the document title, the keyword phrases, index headings, CAS Registry Numbers for indexed substances, the phrases modifying the index headings, and the abstract.

The following is a search of the CA File for fire and explosion studies.

Problem: Find information on fire and explosion hazards in mines.

Log on to STN and the welcome message appears.

∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗   Welcome to STN International ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗

NEWS 1 STN Workshop Information, N. America (Updated Jul 6)
NEWS 2 Join Us for the STN User Meeting
NEWS 3 Abstracts Added to CApreviews — Special Offer
NEWS 4 FREE STN Workshops, User Meeting at ACS Meeting
         We'll Come to You

For a complete list of news messages, type "NEWS" at an arrow prompt.

∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗   STN Columbus   ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗ ∗
FILE 'HOME' ENTERED AT 09:02:24 ON 15 JUL 92

You are automatically logged into the home file, which has the latest news messages for all 146 files on STN. Enter the CA File and perform the search.

⇒ file ca

FILE 'CA' ENTERED AT 09:02:35 ON 15 JUL 92
USE IS SUBJECT TO THE TERMS OF YOUR CUSTOMER AGREEMENT
COPYRIGHT (C) 1992 AMERICAN CHEMICAL SOCIETY (ACS)

FILE COVERS 1967 – 11 Jul 92 (920711/ED) VOL 117 ISS 02.
USE IS SUBJECT TO THE TERMS OF YOUR CUSTOMER AGREEMENT
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⇒ s (fire or explosion) and mine
       26725 FIRE
       10995 EXPLOSION
       10449 MINE
L1   621 (FIRE OR EXPLOSION) AND MINE

Search strategy can be expanded by the use of truncation symbols to retrieve words with the same stem. Thus, the use of the # sign, for one more letter, retrieves the singular and plural search terms.

⇒ s (fire# or explosion#) and mine#
        33437 FIRE#
        11729 EXPLOSION#
        14087 MINE#
L2   816 (FIRE# OR EXPLOSION#) AND MINE#

This search retrieves 816 answers. To display the titles of the first 10 answers, type d 1–10 ti (d = display and ti = title).

⇒ d 1–10 ti

L2   ANSWER 1 OF 816 COPYRIGHT 1992 ACS
TI   Method for extinguishing fires in mines

L2   ANSWER 2 OF 816 COPYRIGHT 1992 ACS
TI   In-mine evaluation of smoke detectors

L2   ANSWER 3 OF 816 COPYRIGHT 1992 ACS
TI   Explosion protection with traveling explosion barriers

L2   ANSWER 4 OF 816 COPYRIGHT 1992 ACS
TI   Early detection of mine fires by evaluation of the composition of conflagration gases

L2   ANSWER 5 OF 816 COPYRIGHT 1992 ACS
TI   Fire propagation along electrical cables and lines

L2   ANSWER 6 OF 816 COPYRIGHT 1992 ACS
TI   Pool fire plume flow in a large-scale wind tunnel

L2   ANSWER 7 OF 816 COPYRIGHT 1992 ACS
TI   How smoke hinders escape from coal mine fires

L2   ANSWER 8 OF 816 COPYRIGHT 1992 ACS
TI   Dumping of residues from lignite-fired power stations in open cast mines

L2   ANSWER 9 OF 816 COPYRIGHT 1992 ACS
TI   Method for providing coating support to rock surfaces, and coating composition used

L2   ANSWER 10 OF 816 COPYRIGHT 1992 ACS
TI   Smoke, carbon monoxide, and hydrogen chloride production from the pyrolysis of conveyor belting and brattice cloth

Here are the titles of some of the answers; most of the answers are of interest, but 8 and 9 may not be exactly the type of answers wanted.

The health and safety aspects of this search are what is of interest and there may be some information in this data set that is not of interest, so we can limit the data by CA section code (there are 80 CA sections). Section 59 contains industrial hygiene and safety information.

⇒ s 12 and 59/sc
        134814 59/SC
L3   311 L2 AND 59/SC

Searching L2 and 59/sc limits the search to section 59 (SC = section code).

⇒ d 1–10 ti

L3   ANSWER 1 OF 311 COPYRIGHT 1992 ACS
TI   Method for extinguishing fires in mines

L3   ANSWER 2 OF 311 COPYRIGHT 1992 ACS
TI   In-mine evaluation of smoke detectors

L3   ANSWER 3 OF 311 COPYRIGHT 1992 ACS
TI   Pool fire plume flow in a large-scale wind tunnel

L3   ANSWER 4 OF 311 COPYRIGHT 1992 ACS
TI   How smoke hinders escape from coal mine fires

L3   ANSWER 5 OF 311 COPYRIGHT 1992 ACS
TI   Smoke, carbon monoxide, and hydrogen chloride production from the pyrolysis of
        conveyor belting and brattice cloth

L3   ANSWER 6 OF 311 COPYRIGHT 1992 ACS
TI   Performance-oriented packaging standards; changes to classification, hazard com-
        munication, packaging and handling requirements based on UN standards and
        agency initiative

L3   ANSWER 7 OF 311 COPYRIGHT 1992 ACS
TI   Complex system for supply of liquid and gaseous nitrogen to Kuznetsk Basin mines

L3   ANSWER 8 OF 311 COPYRIGHT 1992 ACS
TI   Ensuring the sparking resistance of mining equipment made of light alloys

L3   ANSWER 9 OF 311 COPYRIGHT 1992 ACS
TI   A method to evaluate the performance to coal fire extinguishants

L3   ANSWER 10 OF 311 COPYRIGHT 1992 ACS
TI   Analysis of major fires on conveyor belts in potash mining

These answers appear to be safety-related studies.

Problem: Are there any patents on controlling fires and explosions in mines?
To retrieve patents on controlling fires and explosions in mines, the search
query can specify document type (p = patent and dt = document type).

⇒ s L3 and p/dt
        1662439 P/DT
L4   49 L3 AND P/DT

⇒ d 1–10 ti

L4   ANSWER 1 OF 49 COPYRIGHT 1992 ACS
TI   Method for extinguishing fire in mines

L4   ANSWER 2 OF 49 COPYRIGHT 1992 ACS
TI   Method of fighting coal self-ignition in mines

L4   ANSWER 3 OF 49 COPYRIGHT 1992 ACS
TI   Removal of methane mist for preventing explosion in underground headings of gassy
      coal mines

L4   ANSWER 4 OF 49 COPYRIGHT 1992 ACS
TI   Composition for preventing endogenic fires in coal beds

L4   ANSWER 5 OF 49 COPYRIGHT 1992 ACS
TI   Method and apparatus for creating zones without fire hazard in underground mines

L4   ANSWER 6 OF 49 COPYRIGHT 1992 ACS
TI   Method of reducing fire risks in underground headings or workings

L4   ANSWER 7 OF 49 COPYRIGHT 1992 ACS
TI   Joy miner mounted methane detector

L4   ANSWER 8 OF 49 COPYRIGHT 1992 ACS
TI   Agent for suppressing explosions and extinguishing fires in mines

L4   ANSWER 9 OF 49 COPYRIGHT 1992 ACS
TI   Method for detection and decrease of danger of gas and coal breakthrough during
      driving a long underground mining shaft

L4   ANSWER 10 OF 49 COPYRIGHT 1992 ACS
TI   Method for detection of danger of breakthrough of gas and coal in closed under-
      ground mines

Here are the bibliographic record and abstract for an answer, which is
a Russian patent.

⇒ d bib ab

L4   ANSWER 1 OF 49 COPYRIGHT 1992 ACS
AN   CA117(2) : 13705t
TI   Method for extinguishing fires in mines
AU   Kostenko, V.K.; Demenkova, K.M.; Shamardina, I.A.; Belyaeva, L.S.; Krasnyan-
         skii, M.E.; Korol, A.A.
CS   All-Union Scientific-Research Institute of Mine Rescue Operations
LO   USSR
SO   U.S.S.R. From: Otkrytiya, Izobret. 1991, (37), 132.
PI   SU 1682593 A1 7 Oct 1991
AI   SU 89-4717231 11 Jul 1989
IC   ICM E21F005-00
SC   59-5 (Air Pollution and Industrial Hygiene)
DT   P
CO   URXXAF
PY   1991
LA   Russ
AB   The effectiveness of fire extinguishing operations in mines is increased when
         milled urea-formaldehyde resin particles contg. clay at 10–20 wt. parts per
         100 wt. parts of the resin and expanded vermiculite at a resin/vermiculite wt.
         ratio of 85 : 15 are used as the fire extinguishing mixt.

Search results can also be limited by specifying the language of the original document. Retrievals can be limited by using eng/la to get English language results.

⇒ s 14 and eng/la
            6123061 ENG/LA
L5   4 L4 AND ENG/LA

Below is the bibliographic record and abstract for one of the answers from this search.

L5   ANSWER 2 OF 4 COPYRIGHT 1992 ACS
AN   CA104(2) : 10024r
TI   Degasification of coal seam
AU   Miller, Thomas R.
CS   Concoco, Inc.
LO   USA
SO   U.S., 3 pp
PI   US 4544208 A 1 Oct 1985
AI   US 84-633728 23 Jul 1984
IC   ICM E21F005-00
NCL   299012000
SC   59-5 (Air Pollution and Industrial Hygiene)
DT   P
CO   USXXAM
PY   1985
LA   Eng
AB   A coal seam is degasified to prevent CH_4 explosions during mining by drilling a drainage borehole with a drilling rod horizontal to an underground working face, removing the rod and inserting a propping agent, e.g., sand, in the axial passage of the rod and a piston behind the propping agent, reinserting the rod with propping agent and piston in the borehole, and displacing the propping agent from the rod by applying fluid pressure into the passage against the piston and simultaneously withdrawing the rod.

3. The Registry File

In addition to searching for general subjects, one can search for specific chemical substances. Such a search needs to begin in the Registry File to retrieve the CAS Registry Number, which is the index term for the substance in the CA File.

The Registry File contains information on 12 million substances indexed in *Chemical Abstracts* from 1957 to the present. Each new substance indexed during document analysis is added to the file and assigned an identifying number, the CAS Registry Number. Approximately 12,500 substances are added to the file each week. The Registry File can be searched by molecular formula, chemical structure diagram, chemical name, element count, and other substance information.

Problem: Are there explosion or fire hazard studies on nopinone?

The three steps for chemical substance searching in the CA File are:
1. Find the CAS Registry Number for nopinone in the Registry File.
2. Change to the CA File.
3. Use the answer set number (L-number) from Step 1 as a search term in the CA File. The L-number may be combined with other search terms.

Step 1

Enter the Registry File and search the chemical name. Search nopinone/CN (CN = chemical name).

⇒ file reg

FILE 'REGISTRY' ENTERED AT 14:06:24 ON 09 JUL 92
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STRUCTURE FILE UPDATES: 3 JUL 92 HIGHEST RN 142234-88-6
DICTIONARY FILE UPDATES: 6 JUL 92 HIGHEST RN 142234-88-6

⇒ s nopinone/cn
L1   1 NOPINONE/CN

⇒ d L1

L1   ANSWER 1 OF 1 COPYRIGHT 1992 ACS
RN   24903-95-5 REGISTRY
CN   Bicyclo[3.1.1]heptan-2-one, 6,6-dimethyl- (9CI) (CA INDEX NAME) OTHER CA INDEX NAMES:
CN   2-Norpinanone, 6,6-dimethyl- (6CI, 7CI, 8CI) OTHER NAMES:
CN   β-Pinone
CN   6,6-Dimethylbicyclo[3.1.1]heptan-2-one
CN   ∗∗∗Nopinone∗∗∗
MF   C9 H14 O
LC   BEILSTEIN, BIOSIS, CA, CAOLD, CASREACT, CHEMLIST, DSL, EINECS, IFICDB, IFIPAT, IFIUDB, SPECINFO, TSCA

82 REFERENCES IN FILE CA (1967 TO DATE)

The CAS Registry Number for nopinone appears in the first line of the record above (field code RN). In addition to the CAS Registry Number, the records contain:

- CAS index name (CN)
- other CA index names (previous collective names)
- synonyms or other names (CN)
- molecular formula (MF)
- class identifier (CI)
- Registry Number locator (LC)
- structure diagram
- number of references for a substance in the CA File

Step 2

Enter the CA File in order to find information on the compound.

⇒ file ca

FILE 'CA' ENTERED AT 14:08:42 ON 09 JUL 92
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FILE COVERS 1967 – 27 Jun 92 (920627/ED) VOL 116 ISS 26.
For OFFLINE Prints or Displays, use the ABS or ALL formats to obtain abstract graphic
structures. The AB format DOES NOT display structure diagrams.

Step 3

Search the L# from the Registry File search in the CA File. To find hazard
information on nopinone, the terms explosion or fire are also used. Thus,
a Registry Number or a set of CAS Registry Numbers resulting from a Registry
File search can be used as a search term or profile in a bibliographic file.

⇒ s L1 and (explosion# or fire#)
          86 L1
       11710 EXPLOSION#
       33372 FIRE#
L2   2 L1 AND (EXPLOSION# OR FIRE#)

Two answers are found. Both answers are on the synthesis of nopinone, with
one of the answers being on the large-scale synthesis explosion cited in
Chemical & Engineering News that was shown previously.

Below is answer 1. Note that the term highlighted by ∗∗∗ is the CAS Registry
Number for nopinone.

L2   ANSWER 1 OF 2 COPYRIGHT 1992 ACS
AN   CA114 (16) : 149283z
TI   Synthesis of nopinone
AU   Ferreira, Jose Tercio B.
CS   Univ. Sao Carlos
LO   Brazil
SO   Chem. Eng. News, 68(50), 4
SC   59-5 (Air Pollution and Industrial Hygiene)

DT   J
CO   CENEAR
IS   0009-2347
PY   1990
LA   Eng
AB   Explosions may occur in synthesis of nopinone on a large scale. β-Pinene samples
     (each 45 mmol) were ozonized in CH_2Cl_2/MeOH. The 4 samples were combined and
     cooled and AcOH and Zn were added to decomp. the ozonide. The soln. was concd.
     and stored in a freezer. A violent explosion occurred when this combined sample was
     warmed to room temp.
KW   nopinone synthesis explosion hazard; safety nopinone synthesis
IT   Explosion (hazard of, in nopinone synthesis)
IT   Hygiene (industrial, in nopinone synthesis, explosion hazard in relation to)
IT   ***24903-95-5P***, Nopinone (synthesis of, explosion hazard in)

Below is answer 2, with the Registry Number for nopinone also highlighted.

L2   ANSWER 2 OF 2 COPYRIGHT 1992 ACS
AN   CA114(14) : 128191c
TI   Synthesis of nopinone
AU   Gordon, Patrick M.
CS   Organix Inc.
LO   Woburn, MA, USA
SO   Chem. Eng. News, 68(32), 2
SC   59-5 (Air Pollution and Industrial Hygiene)
DT   J
CO   CENEAR
IS   0009-2347
PY   1990
LA   Eng
AB   Caution should be used when synthesizing Nopinone by ozonolysis of β-pinene. At
     the end of the vacuum distn. of the crude Nopinone, the distn. flask exploded.
     Formation of an ozonide impurity may be responsible for the explosion.
KW   Nopinone synthesis pinene ozonolysis explosion;
     safety nopinone synthesis
IT   Explosion (hazard of, in Nopinone synthesis by pinene ozonolysis)
IT   Hygiene (industrial, in Nopinone synthesis explosion hazard in relation to)
IT   127-91-3, β-Pinene (ozonolysis of, in Nopinone synthesis, explosion hazard of)
IT   ***24903-95-5P*** , Nopinone (synthesis of, by pinene ozonolysis, explosion hazard in)

4. Other health and safety files

In addition to the CA File, other files on STN with health and safety
information include:

CHEMLIST — the U.S. Regulated Chemicals listing, which contains informa-
tion about chemical substances listed in the U.S. EPA TSCA Inventory.

CIN — Chemical Industry Notes, which contains information on all business
aspects of the chemical industry, including health and safety.

CSNB — Chemical Safety NewsBase, which provides access to chemical in-
formation related to fires and explosions, storage and transport, toxic sub-
stances, waste removal, and other subjects related to health and safety.

JICST-E — Japan Information Center of Science and Technology English-language database, which contains abstracts of and indexes to scientific and technical information from Japan.

MSDS-CCOHS — Material Safety Data Sheets from the Canadian Centre for Occupational Health and Safety, which contains safety data sheet information for more than 70,000 U.S. and Canadian products manufactured or used in Canadian workplaces.

NTIS — the National Technical Information Service File, which corresponds to Government Reports Announcements and Index for 1964 to the present. Health and safety topics include radiation hazards and control.

5. Conclusions

The CA File and other files on STN are important sources of health and safety information. Because CAS's coverage of the world's chemical literature is so comprehensive, it is an essential database for any search of the health and safety literature. Current information that is needed on health and safety from leading database producers around the world is searchable on the STN International network.