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# The patent examination process: Different approaches to searching at the USPTO

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# Patent examination process

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# What is the role of a patent examiner?

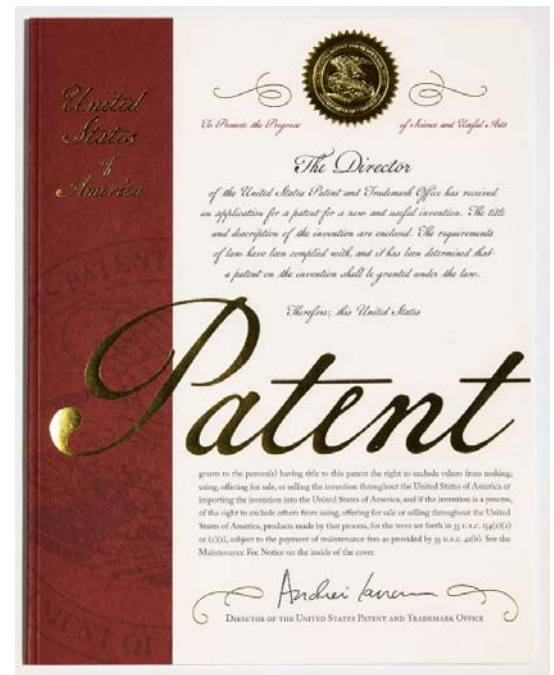
- To protect the public interest with respect to intellectual property
- To provide direct service and assistance to both internal and external USPTO stakeholders
- To examine patentability with respect to invention(s) claimed in a patent application under the conditions for patentability set forth in Title 35 of the United States Code

# What does a patent examiner do?

- Reads and understands the invention set forth in the specification
- Determines whether the application is adequate to define the metes and bounds of the claimed invention
- Determines the scope of the claim(s)
- Searches existing technology for claimed invention
- Ensures that all pertinent procedural steps necessary for obtaining a patent are complied with

# What does a patent examiner do?

- Determines patentability of the claimed invention
- Provides a response, called an office action, identifying and analyzing all issues pertinent to patentability of the claimed invention
- Issues further office actions in response to applicant replies, as appropriate
- Issues notice of allowance or notice of abandonment



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# How does an application get to an examiner?

- Patent applications are given a classification based on the subject matter of the application and assigned to the proper technology center (TC) based on this classification.
- Each TC is an organization with various art units within a broad area of mechanical, electrical, chemical, or design, managed by one or more directors.

**1600 – Biotechnology and Organic Chemistry**

**1700 – Chemical and Materials Engineering**

**2100 – Computer Architecture and Software**

**2400 – Network, Multiplexing, Cable, Security**

**2600 – Communications**

**2800 – Semiconductors/Memory, Optics/Photocopying, Electrical Circuits & Systems and Printing/Measuring & Testing**

**2900 – Design**

**3600 – Transportation, Construction, Agriculture, Electronic Commerce and National Security**

**3700 – Mechanical Engineering, Manufacturing and Medical Devices/Processes**



# What electronic tools does an examiner use?

- **Docket and Application Viewer (DAV)**
  - View docket and applications
- **Prior art search tools**
  - Examiner's Automated Search Tool (EAST)
  - Web Examiner Search Tool (WEST)
  - Electronic databases
- **Official Correspondence (OC)**
  - Write up outgoing correspondences to be sent to applicants/applicant's representatives



# Searching

# How are search strategies developed?

- **Claim interpretation**
  - Read and understand the claimed invention
  - Determine the scope of the claimed invention
- **Consultation with other examiners**
- **Review of the cited prior art**
  - Information disclosure statements, 3rd party submissions
- **Review of patent family documents (foreign, domestic)**
- **Review of international search reports (ISR) and written opinions for PCT 371 applications**

# Where do examiners search?

- U.S. patent databases (e.g. EAST/WEST, Google Patents)
- International patent databases (e.g. Espacenet, WIPO)
- Online databases (e.g. IEEE, PubMed, CAS, ProQuest, STN)
- Internet search engines (e.g. Google, Bing)
- Scientific and Technical Information Center (STIC)
  - Technology-specific, internal USPTO electronic search assistance
- Anywhere they might find the information they need with evidence of the date of publication or availability

# Ways to search a patent application

- Classification search
  - Looking through all documents in a CPC symbol
  - Most useful for mechanical area

A61B 1/00064	. {Constructional details of the endoscope body}
A61B 1/00066	. . {Proximal part of endoscope body, e.g. handles (A61B 1/0052 takes precedence)}
A61B 1/00068	. . . {Valve switch arrangements}
A61B 1/00071	. . {Insertion part of the endoscope body (A61B 1/0055 takes precedence)}
A61B 1/00073	. . . {with externally grooved shaft}
A61B 1/00075	. . . {with externally roughened shaft}
A61B 1/00078	. . . {with stiffening means}
A61B 1/0008	. . . {characterised by distal tip features}
A61B 1/00082	. . . . {Balloons}
A61B 1/00085	. . . . {Baskets}
A61B 1/00087	. . . . {Tools (A61B 17/00234 takes precedence)}
A61B 1/00089	. . . . {Hoods}
A61B 1/00091	. . . . {Nozzles}
A61B 1/00094	. . . . {Suction openings}
A61B 1/00096	. . . . {Optical elements}
A61B 1/00098	. . . . {Deflecting means for inserted tools}
A61B 1/00101	. . . . {the distal tip features being detachable}

# Ways to search a patent application, cont.

- Classification search limited by text

A61B 5/055 (involving electronic [EMR] or nuclear [NMR] magnetic resonance, e.g. magnetic resonance imaging)

AND

(fluid with flow) or velocity

# Ways to search a patent application, cont.

- Text-only search

(eeg or electroencephalogram) and (sleep with stage) and ((night or sleep) with terror)

# Ways to search a patent application, cont.

- Information Disclosure Statement (IDS)
- Inventor and assignee searches
- Forward/backward reference search

# Search strategies for biotech applications

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# Biotech search strategies

- **Biological sequence searches**
  - Public and patent databases
  - DNA and amino acid sequences
- **Chemical compounds and reaction searches**
  - Structure searches
  - Chemical name searches

# USPTO commercial biotech databases

Vendor	Searchable Collection	Comments
<p><b>STN</b> (Scientific and Technical Information Network) Partners are:</p> <ul style="list-style-type: none"> <li>- Chemical Abstract Service (CAS)</li> <li>- FIZ Karlsruhe</li> <li>- Japan Association for International Chemical Information (JAICI)</li> </ul>	<p><b>Contains over 150 databases.</b> STN databases are accessible through three interfaces: STN Express®, STN® on the Web<sup>SM</sup>, or STN Easy®. These interfaces are available to examiners via the Patent Examiner's Toolkit. Requires an ID and password. Offers the largest collection of chemical and related information. Databases cover many scientific disciplines, including biomedical science, chemistry, engineering, materials science, pharmaceuticals, and agricultural science. Coverage varies by database. CAPlus<sup>SM</sup> alone contains more than 40.1 million records which are included in more than 10,000 journals back to early 1800s. <a href="#">STN Catalog (link is external)</a></p>	<p><b>TCs with access:</b> TC 1600, TC 1700, TC 2100, TC 2400, TC 2600, TC 2800, TC 3600, and TC 3700</p>
<p><b>ProQuest Dialog</b> Owned by ProQuest</p>	<p><b>Contains over 100 databases</b> ProQuest Dialog's information focus includes business, intellectual property, law, government, news science and technology through more than 1 billion unique records from the world's most authoritative publishers. ProQuest Dialog is available to patent examiners on the Patent Examiner's Toolkit. Requires an ID and password. Patent Examiners also have access by IP authentication to custom collections of content based on their specific Technology Center. <a href="#">ProQuest Dialog (link is external)</a></p>	<p><b>TCs with access:</b> TC 1600, TC1700, TC2100, TC2400, TC2600, TC2800, TC3600, and TC3700</p>
<p><b>ABSS databases</b> (Automated Biotechnology Sequence Search System)</p>	<p><b>Genetic sequence search system.</b> The USPTO internal genetic sequence search system composed of commercially available databases such as Genbank/EMBL, Geneseq, PIR, and UniProt. In-house databases (pending applications, issued patents, and published applications (PGPubs)) are also available for interference and prior art purposes. Useful for routine sequence searching as well as specialized searches, including alignments, length-limited, oligomer, and score/length.</p>	<p><b>TCs with access:</b> TC 1600</p>

# Sequence searching

- Commercially available vendor at USPTO: ABSS
- Public available searching tools such as NCBI's BLAST
- STN searching smaller sequences and with modified residues
- Applications with biological sequences must comply with the sequence rules and submitting the appropriate CRF (computer readable form)
- The query sequence must have a valid CRF for ABSS searching

# ABSS searchable database content

## Peptide databases

Database name	Results file extension	Producer	Source of sequences
A-Geneseq	.rag	Clarivate Analytics <a href="https://clarivate.com/wp-content/uploads/2018/03/GENESEQ-Fact-Sheet2.pdf">https://clarivate.com/wp-content/uploads/2018/03/GENESEQ-Fact-Sheet2.pdf</a>	Protein sequences extracted from the original (basic) patent documents published by over 40 patent offices worldwide.
PIR	.rpr	National Biomedical Research Foundation	Protein Identification Resource. This database is archival; it is no longer updated.
UNIPROT	.rup	<a href="https://www.uniprot.org/">https://www.uniprot.org/</a>	Universal Protein Resource. Central repository of protein and sequence function created by joining the information contained in Swiss-Prot, TrEMBL, and PIR.
PendingAA	.rapm and .rapn	USPTO	Protein sequences from USPTO pending applications.
IssuedAA	.rai	USPTO	Protein sequences from issued US patents. This information may be available in commercial databases.
Published ApplicationsAA	.rapbm and .rapbn	USPTO	Applications published 18 months after receipt by USPTO. Data in this file may be used for a rejection. This information may be available in commercial databases.

# ABSS searchable database content

## Nucleotide databases

Database name	Results file extension	Producer	Source of sequences
GenEmbl	.rge	National Center for Biotechnology Information <a href="https://www.ncbi.nlm.nih.gov/genbank/">https://www.ncbi.nlm.nih.gov/genbank/</a>	An annotated collection of all publicly available DNA sequences. GenBank is part of the International Nucleotide Sequence Database Collaboration, which comprises the DNA DataBank of Japan (DDBJ), the European Molecular Biology Laboratory (EMBL), and GenBank at NCBI. These three organizations exchange data on a daily basis.
EST	.rst	National Center for Biotechnology Information <a href="https://www.ncbi.nlm.nih.gov/nucest">https://www.ncbi.nlm.nih.gov/nucest</a>	Expressed Sequence Tags (EST) and Sequence Tagged Sites (STS) from GenBank.
N-Geneseq	.rng	Clarivate Analytics <a href="https://clarivate.com/wp-content/uploads/2018/03/GENESEQ-Fact-Sheet2.pdf">https://clarivate.com/wp-content/uploads/2018/03/GENESEQ-Fact-Sheet2.pdf</a>	Nucleic acid sequences extracted from the original (basic) patent documents published by over 40 patent offices worldwide.
PendingNA	.rnpn and .rnpn	USPTO	Nucleic acid sequences from USPTO pending applications.
IssuedNA	.rni	USPTO	Nucleic acid sequences from issued US patents. This information may be available in commercial databases.
Published ApplicationsNA	.rnpbm and .rnpbn	USPTO	Applications published 18 months after receipt by USPTO. Data in this file may be used for a rejection. This information may be available in commercial databases.

# Types of alignments

- **Default: one-to-one using Smith-Waterman algorithm showing best local similarity**
- **Multi-sequence: multiple sequences in a single alignment plot using CLUSTAL W algorithm (Jemboss Emma)**
- **Global: one-to-one global alignment using Needleman-Wunsch algorithm (Jemboss Needle)**



# Types of alignments: multi-sequence

- Multi-sequence: multiple sequences in a single alignment plot using CLUSTAL W algorithm (Jemboss Emma)

```
!!AA_MULTIPLE_ALIGNMENT 1.0
us-15-735-525-2.aln MSF: 318 Type: P 28/08/18 CompCheck: 9040 ..
Name: US-15-735-525-6 Len: 318 Check: 3614 Weight: 24.40
Name: US-15-735-525-8 Len: 318 Check: 6935 Weight: 20.00
Name: US-15-735-525-4 Len: 318 Check: 2549 Weight: 22.20
Name: US-15-735-525-2 Len: 318 Check: 5942 Weight: 33.30

//
1 50
US-15-735-525-6 MRSSTIIQTGLVAVLPFAVQAAASGGKSTRYWDCKPSCAWSGKASVNRP
US-15-735-525-8 MRSSTVLOTGLVAALPFAVQAAASGGQSTRYWDCKPSCSWSGKASVNRP
US-15-735-525-4 MRSTFVLRITLAAALPLVASAAASGGQSTRYWDCKPSCAWSGKAAVSNP
US-15-735-525-2 ~~~~~ADGKSTRYWDCKPSCSWPGKASVNPQ

51 100
US-15-735-525-6 VLACDANNPLNDANVKS GCDGGSAYTCANNPWA VNDNLAYGFAATKLS
US-15-735-525-8 VLACDANNPLSDASVKS GCDGGSAYTCANNPWA VNDQLSYGFAATKLS
US-15-735-525-4 VYACDANFQRLSDENVKS GCGGSA YSCAQTFPWA VNDNLAYGFAATSSIA
US-15-735-525-2 VFACSANFQRLSDENVKS GCDGGSAYACADOTPWA VDNFVYGFATSSIA

101 150
US-15-735-525-6 GGTI ESWCCACYALFTISGPVSGKILVQSTSTGGDLG SNHFDLMPGGG
US-15-735-525-8 GGTI ESWCCACYALFTISGPVAGKIMVQSTSTGGDLG SNHFDIMPPGGG
US-15-735-525-4 GGS ESWCCACYALFTISGPVAGKIMVQSTSTGGDLG SNHFDIAMPGGG
US-15-735-525-2 GGN EASWCCGCELYLFTISGPVAGKIMVQSTSTGGDLG SNHFDLAMPGGG

151 200
US-15-735-525-6 VGLFDGCKREFGGLPGAQYGGI SSRSCDSFP AALKPGCCQWRFDFWFKNAD
US-15-735-525-8 VGLFDGCTQFGGLPGAQYGGI SSRSCDSFP AALKPGCCQWRFDFWFKNAD
US-15-735-525-4 VGLFNGCSSQFGGLPGAQYGGI SSRDQCD SFPALPKPGCCQWRFDFWFKNAD
US-15-735-525-2 VGLFDGCSQFGGLAGDRYGGV SSRSCDSFP AALKPGCYWRFDFWFKNAD

201 250
US-15-735-525-6 NPEFTFKVQCPSELTSRIGCKRNDDSQFP AFTPPSGGGSNPSTPT . . .
US-15-735-525-8 NPNFTFKVQCPSELTSRIGCKRNDDSQFP VFTPPSGGGINPSTPT . . .
US-15-735-525-4 NPTFTFKVQCPSELTSRIGCKRNDDSQFP VFTPPSGGGINPSTPT . . .
US-15-735-525-2 NPFTFTFKVQCPSELVARTGCRNMDGNFVFT PPSGGQSSSSSSSSSAK

251 300
US-15-735-525-6 . . . . . T P P S G G G G S C C A A M Y R A Q C G S G F S G C T N
US-15-735-525-8 . . . . . T P P S G G G . S C C I A D K Y A Q C G S G S G C T N
US-15-735-525-4 . . . . . I A P G S G Q T S P G G G S C C T S Q K W A Q C G I G F S G C T T
US-15-735-525-2 F T S T S T T S T K A T S T I T S A S S Q T S S T G G G C A A Q R W A Q C G I G F S G C T T

301 318
US-15-735-525-6 C P S G S T C K A I N D Y Y H Q C A
US-15-735-525-8 C P S G S T C K T I N D Y Y H Q C A
US-15-735-525-4 C V S G I T C C K L N D Y Y S Q C L
US-15-735-525-2 C V S G I T C N K Q N D W Y S Q C L
```





# Chemical structure searches

- Chemical name search (text searching)
- Chemical compound structure search
- Chemical reaction search
- Patent and non-patent databases

# Example of text searching using Royal Society of Chemistry (RSC)

[About](#)[More Searches](#)[Web APIs](#)[Help](#)[About](#)[More Searches](#)[Web APIs](#)[Help](#)

## Search

Search term: petroselin

Simple

Structure

Advanced

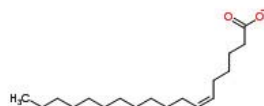
More searches...

petroselinic acid

Systematic Name, Synonym, Trade Name, Registry Number, SMILES

Options

Search



2D 3D Save Zoom

- Charge

- Double-bond stereo

## Petroselinic Acid

ChemSpider ID: **4574391**

Molecular Formula: C<sub>18</sub>H<sub>33</sub>O<sub>2</sub>

Monoisotopic mass: 281.248596 Da

Systematic name

(6Z)-6-Octadecenoate

SMILES and InChIs

SMILES:

[O-]C(=O)CCCC\C=C/CCCCCCCCCCC [Copy](#)

Std. InChI:

InChI=1S/C18H34O2/c1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18(19)20/h12-13H,2-11,14-17H2,1H3,(H,19,20)/p-1/b13-12- [Copy](#)

Std. InChIKey:

CNVZJPUDSLNTQU-SEYXRHQNSA-M [Copy](#)

<http://www.chemspider.com>

# Example of chemical structure search using STNext

The screenshot shows the CAS Structure Editor interface. The top bar includes the CAS logo and the text 'CAS PHYSICAL SCIENCE DIVISION AMERICAN CHEMICAL SOCIETY'. The main window is titled 'Structure Editor' and contains several toolbars and panels. The following components are highlighted with blue boxes:

- Import**: A button in the top toolbar.
- Model**: A button in the top toolbar.
- Atoms, Shortcuts, Variables, R-group menus**: A section of the left toolbar.
- Fragment group point of attachment**: A section of the left toolbar.
- Repeat and Variable point of attachment**: A section of the left toolbar.
- Chain and template tools, selection tools**: A section of the left toolbar.
- Ring and node lock tools**: A section of the left toolbar.
- Reaction tools**: A section of the left toolbar.
- Ring tools**: A section of the left toolbar.
- Attribute Values Panel**: A panel on the right side of the interface.
- Common Atoms and Bond Palette**: A palette at the bottom of the interface.

Structures can be modeled directly from CAS Registry Number® identifiers via **Add to Editor** tool

The screenshot shows the CAS Structure Editor interface with a CAS Registry Number (50-50-0) entered in the 'Add to Editor' tool. The chemical structure of a steroid is displayed in the main window. A text box below the screenshot states: 'SMILES and InChI strings also work.'

STNext at [next.stn.org](http://next.stn.org)

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# Results of chemical structure search using STNNext

HITPPAK displays direct links to substances in the original patent publication (e.g. D HITSTR HITPPAK)

The screenshot displays the HITPPAK interface. On the left, a chemical structure is shown with a methylsulfonyl group, a bromine atom, and a butylamino group. Below it, a list of patent locations is provided, with the entry "2027539-69-9 P, Pg 191" highlighted in yellow. The main window shows the patent document for WO 2016/168682, PCT/US2016/027874. The document is divided into sections for Step 3 and Step 4, each with a chemical structure and a detailed description of the synthesis process. The Step 3 section includes the title "N-[2-amino-5-bromo-3-(butylamino)phenyl]methanesulfonamide" and a description of the synthesis from step 2. The Step 4 section includes the title "N-(6-bromo-1-butyl-2-methylbenzimidazol-4-yl)methanesulfonamide" and a description of the synthesis from step 3.

File: CAPLUS

2027539-69-9 P

Role: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent) (prepn. of substituted heterocyclic compds. as bromodomain inhibitors useful in treating cancer)

PatentPak Location:

- 2027537-87-5 P, Pg 58
- 2027538-43-6 P, Pg 191
- 2027538-44-7 P, Pg 66
- 2027538-45-8 P, Pg 192
- 2027538-46-9 P, Pg 66
- 2027539-69-9 P, Pg 191

PATENTPAK

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WO 2016/168682 PCT/US2016/027874

Key Substances in Patent

Analyst Markup Locations (1) page 190

CAS RN 109-73-9

Analyst Markup Locations (1) page 190

CAS RN 2027539-66-8

Analyst Markup Locations (1) page 191

CAS RN 2027539-69-9

Analyst Markup Locations (1) page 191

CAS RN 2027538-43-6

Step 3: N-[2-amino-5-bromo-3-(butylamino)phenyl]methanesulfonamide

[0440] The title compound of step 2 (450 mg, 1.23 mmol) was suspended in MeOH (30 mL). Saturated aqueous NH<sub>4</sub>Cl (10 mL) and Fe (345 mg, 6.16 mmol) were added, and the mixture was heated at 85°C for 1 hr and then filtered. The insoluble components were rinsed with methanol (30 mL), and the combined filtrate/rinse was diluted with water and extracted with EtOAc (40 mL x 2). The combined extracts were dried over Na<sub>2</sub>SO<sub>4</sub>, filtered, and concentrated to give the title compound (400 mg, 97%) as a white solid. LCMS: 336, 338 (M+H<sup>+</sup>).

Step 4: N-(6-bromo-1-butyl-2-methylbenzimidazol-4-yl)methanesulfonamide

[0441] To the title compound of step 3 (300 mg, 0.9 mmol) in 4 M HCl (0.5 mL, 2.0 mmol) was added 2,4-pentanedione (448 mg, 4.5 mmol). The mixture was heated at 75°C for 1 hr and then cooled to RT, diluted with water, neutralized with aqueous, saturated NaHCO<sub>3</sub>,

# Example of chemical reaction searching using Scifinder

Search Reaction option and create strategy in structure editor and save as substructure option

The screenshot displays the Scifinder Structure Editor interface. On the left, a sidebar contains navigation options: REFERENCES (Research Topic, Author Name, Company Name, Document Identifier, Journal, Patent, Tags), SUBSTANCES (Chemical Structure, Markush, Molecular Formula, Property, Substance Identifier), and REACTIONS (Reaction Structure, highlighted with a red box). The main window, titled 'Structure Editor - Greenone.cdf', shows a chemical reaction between a reactant (4-aminobutan-1-ol) and a product (N-(4-hydroxybutyl)acetamide). A yellow banner at the top of the editor reads 'Click bonds to be formed or broken during the reaction.' On the right, the 'Drawing Editor' panel has 'Reaction' selected. Below it, the 'Get reactions where the structure(s) are:' section has 'Substructures of more complex structures' selected and highlighted with a red box. The bottom status bar shows the chemical formula  $C_7H_{15}NO$  and the coordinates 75.11, 117.15.

# Example of chemical reaction searching using Scifinder

## View Reaction answers and Get References

The screenshot displays the Scifinder interface for a chemical reaction search. At the top left, a red box highlights the "Get References" button. The interface includes a "Tools" dropdown menu, a "Send to SciPlanner" button, and search filters for "Group by: No Grouping" and "Sort by: Relevance". The results section shows "0 of 22403 Reactions Selected" and "Page: 1 of 1494". The first result is titled "1. View Reaction Detail" and includes a "Link" and "Similar Reactions" option. The reaction is labeled "Single Step" and includes the instruction "Hover over any structure for more options." The reaction scheme shows the reaction of 3-aminopropan-1-ol (SMILES: NCCCO) and ethyl acetate (SMILES: CCOC(=O)C) to form N-(3-hydroxypropyl)acetamide (SMILES: CC(=O)NCCCO). The yield is indicated as 98%. A notification at the bottom right states "2 new notifications (Focus assist on)".

# So... what is the best way to search?

- There is no best way.
- Search strategy depends on:
  - technology
  - claims themselves
  - examiner expertise
  - combination of techniques



**Questions?**

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**Thank you!**

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