Patentability – U.S. Perspective

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U.S. Patent Law – Background

- Patents Authorized U.S. Constitution
- Acts of Congress
  - Patent Acts of 1790, 1793, 1836, 1952
  - America Invents Act (AIA) of 2011 – Changed to “First to File” system
  - Codified in Title 35 United States Code (35 U.S.C.)
- Federal Law: applies in all of the United States, its territories and possessions
  - U.S. states cannot grant patent rights
- United States Patent & Trademark Office (U.S.P.T.O.)
  - Examines patent applications and issues U.S. Patents
  - Patent regulations: Title 37 Code of Federal Regulations (37 C.F.R.)
  - Patent Trial and Appeal Board

U.S. Patent Law – Background - Courts

- Interpret the patent laws when deciding disputes involving patent law and appeals from U.S.P.T.O. decisions.
  - United States District Courts (Trial courts)
    - United States Court for the Eastern District of Virginia
  - Court of Federal Claims (Cases involving the U.S. government)
  - **Court of Appeals for the Federal Circuit**
    - Panel Decisions
    - *En banc* Decisions
  - **Supreme Court of the United States**
- Patentability and invalidity:
  - Patentability: whether a patent can be granted for a claim (U.S.P.T.O).
  - Invalidity: unpatentable claim in an issued patent (courts).

Requirements for Patentability - Summary

- Patentable Subject Matter (35 U.S.C. § 101).
- Novelty (35 U.S.C. § 102).
- Non-obviousness (35 U.S.C. § 103).
- Disclosure requirements (35 U.S.C. § 112).
  - Written description of the invention.
  - Enable person of ordinary skill in the art to make/use the invention.
  - Definiteness (claims must be clear).
  - Best mode of carrying out the claimed invention.

Patentable Subject Matter (35 U.S.C. § 101)

- 35 U.S.C. § 101.

  Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

- New & useful:
  - Articles of Manufacture.
  - Compositions of Matter.
  - Processes / Methods.
  - Improvements of any of the above.

Patentable Subject Matter Exceptions

- Exceptions to Patentable Subject Matter.
  - Laws of Nature.
  - Physical Phenomena.
  - Abstract Ideas.
  - "No patent may issue on a claim directed to or encompassing a human organism." (AIA § 33).
- Examples of Exceptions.
  - Electromagnetism (*O'Reilly v. Morse*, 56 U.S. 62 (1854)).
  - Computer Algorithm (*Gottschalk v. Benson*, 409 U.S. 63 (1972)).
  - Transient Signals (*In re Nuijten*, 515 F.3d 1361(Fed. Cir. 2008)).
  - Method that only embodies an abstract concept such as hedging risk (*Bilski v. Kappos*, 561 U.S. 130 (2010)).
- No Exception for Methods of Treatment or Diagnostic Methods.

Diamond v. Chakrabarty (1980).

- 447 U.S. 303 (1980). U.S. Supreme Court.
- Claims directed to a genetically modified bacterium that was useful for treating oil spills.
- **Held**: A living, man-made micro-organism is patentable subject matter as a "manufacture" or "composition of matter."
  - The fact that the organism is alive does not bar to patentability.
- In choosing such expansive terms as “manufacture” and “composition of matter” modified by the comprehensive “any” Congress plainly contemplated that the patent laws would be given wide scope.
- **“Congress intended statutory subject matter to ‘include anything under the sun that is made by man.’"** *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980).

Mayo Collaborative Services v. Prometheus Labs., Inc. (2012).

- 132 S.Ct. 1289, 566 U.S. ___ (2012). U.S. Supreme Court.
- Claims directed to a method of administering a drug, measuring metabolites of the drug, and determining threshold metabolite levels for increasing or decreasing the dose were not patentable subject matter.

> A method of optimizing therapeutic efficacy for treatment of an immune-mediated gastrointestinal disorder, comprising:
>
> (a) **administering a drug** providing 6-thioguanine to a subject having said immune-mediated gastrointesti-nal disorder; and
>
> (b) **determining the level of [metabolite]** 6-thioguanine in said subject having said immune-mediated gastrointesti-nal disorder,
>
> wherein the **level of 6-thioguanine less than about 230 pmol per 8x108 red blood cells indicates a need to increase the amount** of said drug subsequently admin-istered to said subject and wherein the **level of 6-thioguanine greater than about 400 pmol per 8x108 red blood cells indicates a need to decrease the amount** of said drug subsequently ad-ministered to said subject.

- The **correlation** between the naturally-produced metabolites and therapeutic efficacy and toxicity was an **unpatentable "natural law"**
- **Claims to diagnostic methods** are not patentable if claims amount to nothing significantly more than claiming a natural law. *Ariosa Diagnostics, Inc. v. Sequenom, Inc*., 788 F.3d 1371 (Fed. Cir. 2015).

Association for Molecular Pathology v. Myriad Genetics, Inc. (2013).

- 133 S. Ct. 2107, 569 U.S. ____ (2013) U.S. Supreme Court.
- Concerned with patents claiming isolated DNA sequences of BRCA1 and BRCA2 genes associated with breast cancer.
- A **naturally occurring DNA sequence is a product of nature and not patent eligible** merely because it has been isolated.

  > Myriad's claims [are not] saved by the fact that isolating DNA from the human genome severs chemical bonds and thereby creates a nonnaturally occurring molecule. Myriad's claims are … not expressed in terms of chemical composition, nor do they rely in any way on the chemical changes that result from the isolation of a particular section of DNA. Instead, the claims … focus on the genetic information encoded in the BRCA1 and BRCA2 genes.

- Complementary DNA ("cDNA") whose sequence is not identical to a naturally occurring sequence is patent eligible because it is not naturally occurring.

Novelty (35 U.S.C. § 102)

- **Basic Rule**: Invention (as defined in claim) not patentable if invention within the scope of the claim is known in the "prior art".
- Section 102 defines scope of "prior art."
- Was recently modified by AIA to implement "first to file" rule for patents filed after March 15, 2013.

35 U.S.C. § 102

(a) Novelty; Prior Art.— A person shall be entitled to a patent unless—

(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention; or

(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122 (b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

(b) Exceptions.—

(1) Disclosures made 1 year or less before the effective filing date of the claimed invention.— A disclosure made 1 year or less before the effective filing date of a claimed invention shall not be prior art to the claimed invention under subsection (a)(1) if—

(A) the disclosure was made by the inventor or joint inventor or by another who obtained the subject matter disclosed directly or indirectly from the inventor or a joint inventor; or

(B) the subject matter disclosed had, before such disclosure, been publicly disclosed by the inventor or a joint inventor or another who obtained the subject matter disclosed directly or indirectly from the inventor or a joint inventor.

(2) Disclosures appearing in applications and patents.— A disclosure shall not be prior art to a claimed invention under subsection (a)(2) if—

(A) the subject matter disclosed was obtained directly or indirectly from the inventor or a joint inventor;

(B) the subject matter disclosed had, before such subject matter was effectively filed under subsection (a)(2), been publicly disclosed by the inventor or a joint inventor or another who obtained the subject matter disclosed directly or indirectly from the inventor or a joint inventor; or

(C) the subject matter disclosed and the claimed invention, not later than the effective filing date of the claimed invention, were owned by the same person or subject to an obligation of assignment to the same person.

(c) Common Ownership Under Joint Research Agreements.— Subject matter disclosed and a claimed invention shall be deemed to have been owned by the same person or subject to an obligation of assignment to the same person in applying the provisions of subsection (b)(2)(C) if—

(1) the subject matter disclosed was developed and the claimed invention was made by, or on behalf of, 1 or more parties to a joint research agreement that was in effect on or before the effective filing date of the claimed invention;

(2) the claimed invention was made as a result of activities undertaken within the scope of the joint research agreement; and

(3) the application for patent for the claimed invention discloses or is amended to disclose the names of the parties to the joint research agreement.

(d) Patents and Published Applications Effective as Prior Art.— For purposes of determining whether a patent or application for patent is prior art to a claimed invention under subsection (a)(2), such patent or application shall be considered to have been effectively filed, with respect to any subject matter described in the patent or application—

(1) if paragraph (2) does not apply, as of the actual filing date of the patent or the application for patent; or

(2) if the patent or application for patent is entitled to claim a right of priority under section 119, 365 (a), or 365 (b), or to claim the benefit of an earlier filing date under section 120, 121, or 365 (c), based upon 1 or more prior filed applications for patent, as of the filing date of the earliest such application that describes the subject matter.

Novelty (35 U.S.C. § 102)

- Under AIA, prior art includes any of the following prior to *filing date* of application:
  - Printed publication.
  - In public use (worldwide).
  - On sale (worldwide).
  - Otherwise available to the public.
  - Described in issued patent or published patent application *with effective filing date* before filing date of patent application.
- Exceptions for:
  - Disclosure by inventor (or another who obtained subject matter from inventor) 1 year or less prior to filing application.
  - Earlier filed patent disclosures obtained from inventor, or in patent or application which is commonly owned with claimed invention or owned by party to common research agreement.

Applying Novelty Test to a Claim

- "A claim is anticipated only if **each and every element as set forth in the claim** is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987).
- "When a claim covers several structures or compositions, either generically or as alternatives, the claim is deemed anticipated if **any of the structures or compositions within the scope of the claim** is known in the prior art." *Brown v. 3M*, 265 F.3d 1349, 1351 (Fed. Cir. 2001).
- All features of a claim need **not be disclosed expressly if the missing feature is inherent** in what is described in the reference.
  - [E]vidence must make clear that the missing descriptive matter is **necessarily present** in the thing described in the reference." *Continental Can Co. USA v. Monsanto Co*., 948 F.2d 1264 (Fed. Cir. 1991).

Non-Obviousness (35 U.S.C. § 103)

- Invention is also not patentable if claimed invention **would have been obvious to one skilled in the art** over prior art (as defined in § 102).
- 35 U.S.C. § 103:

  > A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, **if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious** before the effective filing date of the claimed invention to a **person having ordinary skill in the art** to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

- Person having ordinary skill in the art ("PHOSITA").
- Obviousness can be based on **combination of references**.

Non-Obviousness (35 U.S.C. § 103)

- Factual enquiries to determine obviousness (*Graham v. John Deere*, 383 U.S. 1 (1966):
  - (A) Ascertaining the scope and content of the prior art; and
  - (B) Ascertaining the differences between the claimed invention and the prior art; and
  - (C) Resolving the level of ordinary skill in the pertinent art.
- Considering objective evidence relevant to obviousness ("secondary considerations"), e.g.
  - Evidence of commercial success
  - Long-felt but unsolved needs
  - Failure of others
  - Unexpected results.
- "Secondary considerations" are not relevant to novelty, but are evidence that an invention would not have been obvious.

KSR v. Teleflex, 550 U.S. 398 (2007)

- Rejected a standard for obviousness developed by the Federal Circuit Court which required that finding of obviousness based on combination of references had to show that the prior art provided a **teaching, suggestion or motivation** to combine the prior art elements.
  - Acknowledged that was a “helpful insight”.
  - But rejected “rigid application” of the test.
- Reaffirmed the *Graham* test.
- Made it easier than before for applications to be rejected or patents invalidated based on obviousness.

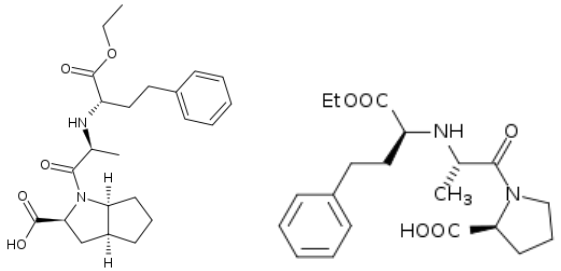
Pfizer Inc. v. Apotex Inc., 480 F.3d 1348 (Fed. Cir. 2007)

- Pfizer sued Apotex for infringement of patent which claimed amlodipine benzensulfonate (besylate) salt.
- Prior art:
  - Earlier Pfizer patent disclosed amlodipine listed 10 acid addition salts with only maleate exemplified.
  - Berge reference taught 53-FDA-approved anions for making salts.
- Pfizer scientists found maleate was sticky and chemically unstable (Michael addition to maleate C=C bond) in tablet form. Tested 7 other acid addition salts and found besylate had superior properties.
- District Court: Held claims valid (not obvious).
  - Besylate rarely used for pharmaceutically acceptable salts (0.25% of drugs)
  - No way to predict properties of salts.
  - Besylate salt had unexpectedly superior properties.

Pfizer Inc. v. Apotex Inc., 480 F.3d 1348 (Fed. Cir. 2007) (cont'd)

- Federal Circuit Court of Appeal – **Reversed**.
  - **Held**: claims were **invalid as obvious**.
  - Person skilled in the art would have been motivated to replace maleate with anion which lacked the double bond.
  - Would have been logical to use Berge's list of anions, which listed only a small number of anions for pharmaceutically acceptable salts, as replacements.
  - Skilled artisan would have considered besylate favorably because of its known acid strength, solubility, and other known chemical characteristics as reported in several prior art publications.
  - Prior art provided reasonable expectation that besylate salt would form and work for its intended purpose.
  - Identification of besylate salt required no more than routine testing/optimization.
  - Superiority of besylate was not unexpected because the 53 anions would be expected to have a range of properties.

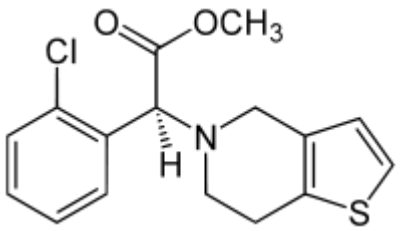
Aventis Pharma Deutschland GmbH v. Lupin, Ltd., 499 F.3d 1293 (Fed. Cir. 2007)



- Claims directed to Ramipril (ACE inhibitor).
- 32 possible stereoisomers.
- Patent in suit claimed the (SSSSS) isomer.
- Prior Art:
  - Enalapril was (SSS) enantiomer and 700x more potent than (SSR) enantiomer.
  - Schering scientist prepared a mixture of (SSSSS) and (SSSSR) Ramipril and found it was active in inhibiting ACE (prior art under 35 U.S.C. 102(g))
  - Aventis licensed Schering's patent covering Ramipril.
- District Court: not obvious because PHOSITA would not necessarily have been motivated to isolate (SSSSS) isomer.
- Federal Circuit: Reversed - (SSSSS) isomer would have been obvious.
  - Separation *prima facie* obvious when known that desirable property of a mixture derives in whole or in part from one component, or if the prior art provides reason to believe that this is so, and purified compound is prima facie obvious over the mixture.
  - (SSSSS) obvious because (SSSSS) and (SSSSR) isomers differed in non-bridgehead atom which had (S) configuration in Enalapril: there was close analogy between (SSSSS)/(SSSSR) pair and (SSS)/(SSR) Enalapril.

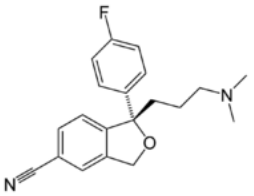
Sanofi Synthelabo v. Apotex, 550 F.3d 1075 (Fed. Cir. 2008)

- Clopidrogel bisulfate:

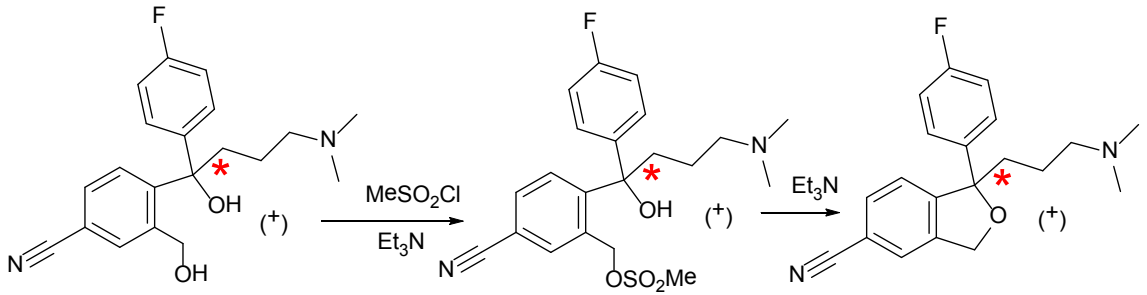


- Affirmed holding that the claims to clopidrogel bisulfate were not obvious over prior art disclosing racemic compound (as HCl salt):
  - Separation of enantiomers was **difficult and unpredictable**.
  - Possibility that separated enantiomer would racemize.
  - **Unexpected results**: (S) enantiomer has all the desired activity and neurological side effects (convulsions) were in the (R) enantiomer.
  - Distinguished *Pfizer v. Apotex* regarding the bisulfate salt:
    - In Pfizer there was evidence that narrowed possible salts to only a few.
    - Evidence **teaching away** from bisulfate – strong acid would be expected to promote racemization

Forest Labs. Inc. v. Ivax Pharms., Inc., 501 F.3d 1263 (Fed. Cir. 2007)



- (S)-(+)-citalopram:
- Prior art reference disclosed racemate
- Evidence of **failed attempts to resolve citalopram** by HPLC and via racemic salt.
- Inventors resolved a diol intermediate: not obvious because of possibility the resolved intermediate would re-racemize:



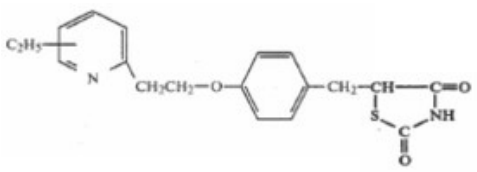
- Federal Circuit affirmed claims would not have been obvious:
  - PHOSITA would be motivated to develop new compounds rather than attempt difficult and unpredictable resolution of known racemate.
  - No reasonable expectation of success.

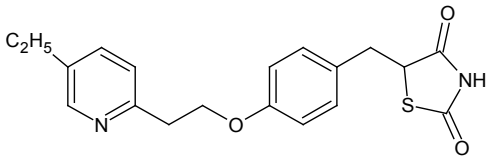
Bayer Schering Pharma AG v. Barr Labs., Inc. 575 F.3d 1341 (Fed. Cir. 2009)

- Formulation of drospirenone (steroid contraceptive)
  - Micronized and exposed to gastric environment on dissolution (not enterically coated).
- Drospirenone was acid-labile and micronization was expected to increase rate of ionization as well as absorption.
- Bayer experimented and found enteric coatings made contraceptive effectiveness more variable.
- Micronized drug without enteric coating was effective because drug was absorbed more rapidly than it isomerized.
- Federal Circuit held claims invalid as obvious:
  - Obvious to try because prior art suggested micronization would improve solubility and “normal” uncoated and enteric-coated were then limited number of options to solve problem of formulating the acid-sensitive hydrophobic drug.

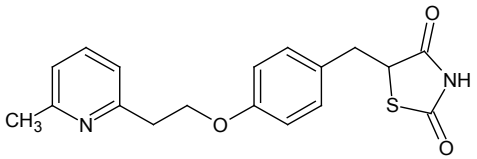
Takeda Chemical Industries Ltd. v. Alphapharm Pty. Ltd., 492 F.3d 1350 (Fed. Cir. 2007).

- Patent directed to ethyl-substituted pyridine thiazolidinediones for treating type 2 diabetes, including pioglitazone.
- Prior art disclosed a genus of thiazolidinediones, and 54 examples including "compound b"
- Defendants argued pioglitazone would have been obvious because it would have ben obvious to try modifying "compound b" via homologation and "ring-walking".





Pioglitazone



"Compound b"

- District Court: claims not invalid.
  - **No motivation in prior art to select compound b as a lead compound** for antidiabetic research beause prior art described that **compound b had toxic effects** – increasing body weight and brown fat weight.
  - Nothing suggested that adding a CH_2 group or changing the position of substitution would increase efficacy or reduce toxicity.
  - Pioglitazone had **unexpected results** of non-toxicity which would overcome any prima facie case of obviousness.

Takeda v. Alphapharm (Cont'd).

- Federal Circuit: affirmed.
  - Not obvious to try.
    - May be enough to show obviousness when that "[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions".
    - **Not finite**. Millions of compounds within scope of reference
    - **Not predictable solutions**. Compound b was toxic.
  - *Prima facie* case of obviousness over structurally similar compound in the prior art ("**lead compound test**"):
    - Necessary to identify **some reason that would have led a chemist to modify a known compound in a particular manner** to establish prima facie obviousness of a new claimed compound.
    - Includes a preliminary finding that one of ordinary skill in the art would have **selected the known compound as a lead compound**.

Double Patenting

- 35 U.S.C. § 101.

  Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, **may obtain a patent therefor**, subject to the conditions and requirements of this title.
- Only one patent per invention so cannot obtain two patents claiming exactly the same invention.
- Statutory prohibition extended to prohibit obtaining two patents with claims that are obvious variants ("non-statutory obviousness-type double patenting") unless **terminal disclaimer** is filed in the later-filed (or later-expiring) patent.
- Terminal disclaimer requires that second patent expire no later than earlier patent to prevent unjustified extension of patent.
  - Also requires common ownership to be maintained for second patent to be enforceable.
- Similar analysis to non-obviousness except that claim of prior patent is considered as prior art.
- May apply when earlier patent is otherwise disqualified as prior art.

35 U.S.C. § 112 – Disclosure Requirements

(a) **In General.—** The specification shall contain a **written description of the invention**, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to **enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same**, and shall set forth the **best mode contemplated by the inventor or joint inventor of carrying out the invention**.

(b) **Conclusion.—** The specification shall conclude with one or more claims **particularly pointing out and distinctly claiming** the subject matter which the inventor or a joint inventor regards as the invention.

- Requirements:
  - **Written description requirement** – must describe the claimed invention.
  - **Enablement requirement** – must enable the person skilled in the art to make and use the invention.
  - **Best mode requirement** – must disclose the best mode of carrying out the invention.
  - **Clarity requirement** – claims must not be indefinite or ambiguous.

Written Description Requirement

- Patent must provide written description of what the claimed invention is.
- Potential Issue with functional claims.
  - *Ariad Pharmaceuticals v. Eli Lilly & Co.* 598 F. 3d 1336 (Fed. Cir. 2010). Inadequate WD to support genus claims encompassing use of all substances which reduce NF-κB binding but did not identify actual compounds which performed the function.
- Also guards against claiming new matter not disclosed in original application.

Enablement Requirement

- Patent must include description that enables person of ordinary skill in the art to make and use claimed invention without undue experimentation.
- Potential when claims are broad relative to working examples, the art is unpredictable, or the use is speculative.
- Factors considered (*In re Wands*, 858 F.2d 731 (Fed. Cir. 1988).
  - Breadth of the claims;
  - Nature of the invention;
  - State of the prior art;
  - Level of one of ordinary skill;
  - Level of predictability in the art;
  - Amount of direction provided by the inventor;
  - Existence of working examples; and
  - Quantity of experimentation needed to make or use the invention based on the content of the disclosure.

Best Mode Requirement

- Patent must describe the best mode contemplated by the inventors of carrying out the invention at the time of filing.
- Best mode does not have to be identified.
- Under AIA patents may no longer be held invalid or unenforceable for failure to disclose the best mode, but best mode remains a requirement for patentability.

Clarity Requirement

- Patent claims must be clear: “a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." Nautilus, Inc. v. Biosig Instruments, Inc. 134 S.Ct. 2120, 2124 (2014).
- *Teva Pharms USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335 (Fed. Cir. 2015).
  - Claims that defined the molecular weight distribution of a polymer in terms of an **average M.W. were indefinite because there were different ways of measuring average M.W**. and it was not possible to determine which was meant with reasonable certainty from the specification and file history.
    - M_p (peak M.W.); M_n (number average M.W.); M_p (wt. average M.W.).
    - M_p, M_n and M_w may have different values for a given polymer.
    - Inconsistent arguments were made during prosecution of the patent.
  - Claims that defined the M.W. distribution in terms of the **percentage of molecules falling in a given M.W. range** were not indefinite because the **M.W. defining the range were exact values** not statistical measures.

Thank you!

QUESTIONS?

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