United States District Court,
S.D. Indiana, Indianapolis Division.

DOW AGROSCIENCES LLC,
Plaintiff.
v.
CROMPTON CORPORATION and Uniroyal Chemical Company, Inc,
Defendants.

No. 1:03-CV-0654-SEB-JPG

May 12, 2004.

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ENTRY ON CLAIM CONSTRUCTION

BARKER**, J.**

This matter comes before the Court for the purposes of construing a certain patent term integral to the underlying infringement action. Plaintiff Dow Agrosciences LLC ("Dow") and Defendants Crompton Corporation ("Crompton") and Uniroyal Chemical Company ("Uniroyal") (collectively "Defendants") have presented the Court with proposed constructions for the term "substituted phenyl group" as it is used in Claim 1 of U.S. Patent No. 4,697,044 ("the '044 patent"); Claim 1 of U.S. Patent No. 4,833,151 ("the '151 patent"); and Claims 1, 2, 3, and 4 of U.S. Patent No. 5,142,064 ("the '064 patent"). Following a *Markman* hearing on April 14, 2004, we enter the following factual and legal findings related to the construction of the disputed patent language.

Factual and Procedural Background

At the center of this patent infringement suit is the compound "noviflumuron," manufactured by Dow, the active ingredient of a bait matrix that is used in conjunction with the Sentricon Colony Elimination System to monitor and eliminate termites. Pl.'s Br. on Claim Constr. ("Pl.'s Br.") p. 2. Defendants allege that noviflumuron infringes three of their patents, the '044 patent, the '151 patent, and the '064 patent." Def.'s Resp. Br. on Claim Constr. ("Def.'s Resp.") p. 1. The '044 and '151 patents have expired. Pl .'s Br. p. 3. The '064 patent remains active until August 25, 2009. Def.'s Resp. p. 14-15.

The patents in suit derive from U.S. Patent No. 3,748,356 ("the '356 patent") filed on May 19, 1971. Pl.'s Br. p. 3; Def.'s Resp. pp. 2-3. (It, too, has expired. Pl.'s Br. p. 3.) This original "parent" patent was assigned

initially to the U.S. Philips Corporation. During the prosecution of this "family" of patents, Duphar International Research B.V. became the assignee of subsequent continuation or "child" patents, including the three patents in suit. Defendant Uniroyal, a subsidiary of Defendant Crompton, acquired the entire right, title, and interest in the patents in suit from Duphar International Research B.V., as part of its purchase of assets from an intermediate company, Solvay Duphar B.V. in 1995. Together, these predecessor corporations-U.S. Philips Corporation, Solvay Duphar B.V., and Duphar International Research B .V.-are referred to as "the Philips Group." Def.'s Resp. pp. 2-4.

Since the 1970s, Dow and its predecessor companies, including DowElanco, have transacted related business with members of the Philips Group. Def.'s Resp. pp. 3-4. Dow acquired licenses to insecticide compounds owned by the Philips Group for commercial use. Defendants maintain that this commercial activity, as well as Dow's knowledge of the corresponding patents owned by the Philips Group, is the foundation from which Dow engaged in independent research to develop one or more specific insecticide compounds, including hexaflumuron and noviflumuron. Id. In 1994, Solvay Duphar B.V. gave DowElanco a license under the three patents in suit to make, use, and sell hexaflumuron. Pl.'s Br. p. 3. No member of the Philips Group, however, gave Dow any license to produce the insecticide compound at issue in this case, noviflumuron. Id. Defendants assert that noviflumuron comes within the scope of, and therefore infringes, one or more of the claims of the '044 patent, the '151 patent, or the '064 patent.

On May 6, 2003, in response to Defendants' repeated charges of infringement, Dow filed a declaratory judgment action in this court seeking a judgment that noviflumuron does not infringe any of the patents in suit and/or that these patents are invalid. Compl.; Pl.'s Br. p. 3. The parties base their arguments of infringement and validity on their respective claim constructions, and specifically, on their differing interpretations of the term "substituted phenyl group." On April 14, 2004, the Court convened a *Markman* hearing, at which the parties presented argument and exhibits to supplement their claim construction briefs. All issues having now been submitted, we construe the disputed claims in this Entry.

Summary of the Technology

We begin with the basic science underlying this dispute. FN1 The patents in suit are directed to *organic* (carbon-containing) molecules or compounds. Organic molecules (also known as organic compounds) make up about 90 percent of all chemical compounds extant in the world and in nature. Everything from alcohol to human beings themselves are made up of organic compounds. Making an organic compound involves the performing of a chemical reaction on a molecule to create a different molecule.

FN1. This summary is drawn from the Declaration of Dr. Mark A. Lipton, Dow's expert witness in this case, as set out in Dow's Opening Brief on Claim Construction, pages 3-11. *See id.,* App. D, Lipton Decl. para. para. 8-31. As we discuss below, Defendants object to the use of Dr. Lipton's opinion testimony as extrinsic evidence to the claim construction. They do not, however, dispute his explanation of organic chemistry, and specifically, the structures and nomenclatures used in this case. *See* Def.'s Resp. Br. on Claim Constr. at p. 9, 530 F.2d 1342.

To make a molecule or compound, a chemist starts with commercially available substances and combines them by application of known chemical methods. These methods may include combining two or more substances or treating a substance with energy such as light and heat. When a chemist makes a compound, a chemist is working toward a chosen target, and does so because of the properties the resulting compound is

expected to have. Solubility, chemical stability, costs and availability of starting materials, safety, and the effort required to make a compound are important considerations in determining whether it is feasible or desirable to make any specific, resultant compound.

A vast number of chemical transformations are known in the scientific literature. This literature provides chemists with a known set of conditions and combinations which, in turn, produce an expected result. Certain information regarding a compound can be derived from the structure of the compound itself, based on a chemist's personal knowledge of the structure, and the knowledge in the scientific community. Lesser known structures, however, reveal less in and of themselves because such basic attributes as toxicity, potential for explosion, fate in the environment, or even whether it is a solid or a liquid have yet to be documented.

Organic Systems Applicable to this Case

Atoms are the smallest units of a molecule that remain unchanged during a chemical reaction; they are chemically indivisible. An organic molecule consists of at least two atoms and, by definition, must contain one or more carbon atoms. Typically, an organic molecule also contains hydrogen atoms, which are joined to carbon (and/or to other atoms) by bonds to form the molecule. These bonds are formed by the sharing of valence electrons, which contain a charge of negative electricity. Each atom has a specified number of valence electrons with which it can create bonds to another atom to form a compound. Carbon, for example, has four valence electrons. Hydrogen has one. Thus, carbon will commonly bond with four hydrogen atoms to form methane (CH_4). In CH_4, each hydrogen atom shares one pair of electrons with the carbon atom. When two atoms share more than one pair of electrons, they may form a double bond or even a triple bond. Organic molecules also commonly contain nitrogen, oxygen, sulfur, etc. These elements are usually referred to by their atomic symbols. In the table below, several atomic symbols are listed.

Element	Symbol
Carbon	C
Hydrogen	H
Oxygen	O
Nitrogen	N
Sulfur	S
Chlorine	Cl
Fluorine	F
Bromine	Br
Iodine	I

Structural Diagrams Of Organic Molecules

One of the most common and powerful methods of describing a particular molecule is the structural diagram, a pictorial representation of the atoms and the bonds that connect them, thereby forming a molecule. A typical structural diagram (that of ethanol or grain alcohol) is shown below.

In this representation, the atoms are indicated by their atomic symbols, and the bonds that connect one atom to another are indicated by lines. It contains only single bonds; organic molecules containing single and double bonds, are exemplified by the structure shown below.

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In this structure, the carbon atoms are connected to each other by alternating single and double bonds. The double bonds are represented by two parallel lines. In addition, this structure is *cyclic* because the bonding forms a ring of carbon atoms, in this case a ring of 6 carbons. The structure shown is that of one of the most common and important organic molecules, *benzene*. Although the diagrams used as examples completely describe the structure and bonding of organic molecules, it becomes cumbersome and tedious to use such a system to describe more complex organic molecules. For this reason, organic chemists typically employ abbreviated structural diagrams. Such diagrams are shown below for the two organic molecules already discussed, ethanol and benzene.

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In these structures, the hydrogen atoms bonded to carbon, and the bonds used to connect them, are omitted for clarity and simplicity. Note, however, that the hydrogen bonded to the oxygen of ethanol is retained by convention. The carbon atoms are also represented by the intersection of two bonds, forming an angle or a corner. Such structural abbreviation is possible because of the rigid rules of bonding in organic chemistry: in addition to carbon and hydrogen (which, as noted, always have four bonds and one bond respectively), oxygen has two bonds, and nitrogen has three. Fluorine, chlorine, bromine, and iodine all can have only one bond to them. Therefore, the two abbreviat ed structural diagrams shown above imply the presence of hydrogen by the presence of fewer than four bonds to a given carbon atom. In this exercise, double bonds are counted as two bonds.

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Organic Nomenclature

In addition to structural representations of molecules, organic chemists have also developed conventions for naming these structures. Ideally, the name of an organic molecule is synonymous with its structural formula so that every molecule would have a unique name from which an organic chemist could infer its chemical structure. The most important system for naming organic molecules is the systematic nomenclature developed in the mid-20th Century by the International Union of Pure and Applied Chemistry. In this system, molecules are named by dividing the structure into a core structure and various substituents, i.e., an atom or group of atoms that substitutes for a hydrogen atom on that core structure. In the case of chlorobenzene (shown below), the molecule is named as a derivative of benzene, the core structure, and the prefix, chloro-, indicates the name of the substituent, chlorine. Substituent names are derived from the name of the parent species by adding a suffix that designates its status as a substituent on another structure (in this case, the suffix is -o).

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Systematic names, however, are not the only names employed in organic chemistry. Many common names, typically names that were applied before the development of the systematic nomenclature or that are commercial or trade names, are still used because of either their simplicity or their widespread popularity. Benzene is an example of a common name. When a benzene ring is a substituent on another core structure, it is called a "phenyl" group. "Pyridine" is the common name for a benzene ring in which one carbon has been replaced by a nitrogen atom. When a pyridine ring is a substituent, it is referred to as a "pyridyl" group. Shown in the table below is a brief list of some other important substituent names and their corresponding structures.

Name	Structure

methyl	$-CH_3$
hydroxy	-OH
alkoxy	-OR [2]
nitro	$-NO_2$
cyano	-CN
alkylthio	-SR
alkyl	$-C_nH_{2n+1}$
acyl	-C(=O)R
alkoxycarbonyl	-C(=O)OR

FN2. "R" refers to what is called a "radical" and is a generic term for a group of atoms that behaves as a single atom in a chemical reaction. *See* Hackh's Chemical Dictionary, at 569 (4^{th} ed.1969), the same dictionary relied on by the Examiner in the prosecution of the patents in suit. In this chart, "R" refers to an unspecified "alkyl," i.e., an alkane substituent.

Generic Names

It is often useful to be able to refer to a group of structurally similar molecules collectively. To that end, organic chemists have employed various names to describe certain groups of molecules. Some important examples are the *hydrocarbons* (molecules that consist of only carbon and hydrogen atoms), the *alkanes* (hydrocarbons that contain only carbon-carbon single bonds and do not form rings) and the *cycloalkanes* (cyclic, *i.e.*, arranged in a ring, hydrocarbons that contain only carbon-carbon single bonds).

Some examples of the alkanes are:

CH_4	methane
$H_3C\text{-}CH_3$	ethane
$H_3C\text{-}CH_2\text{-}CH_3$	propane
$H_3C\text{-}CH_2\text{-}CH_2\text{-}CH_3$	butane

Some examples of cycloalkanes are drawn as follows:

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When an alkane is a substituent, it is referred to as an "alkyl" group. Likewise, cycloalkane substituents are referred to as "cycloalkyl" groups. Another generic name that is frequently employed is the term "halogen" or "halo," which refer collectively to the elements fluorine, chlorine, bromine and iodine.

The Patents in Suit

The patents in suit here claim certain classes of molecules classified as benzoyl ureas and thionated variations thereof. Benzoyl ureas are derivatives of the molecule of urea. FN3 A benzoyl group is another

common name that refers to benzene as a substituent that is bonded to the core structure through a carbonyl group (CO), as shown below:

FN3. Urea is an old molecule; in fact, it was the first organic compound synthesized in 1828. Urea is the end product of mammalian protein metabolism, the chief nitrogenous constituent of urine. *See* Hackh's Chemical Dictionary, at 703.

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A urea is core structure that has two nitrogen atoms bonded to a carbonyl as shown below:

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A benzoyl group can also be correctly called a phenylcarbonyl group because the benzene is a substituent as described above, but this latter name is less common than benzoyl group. Thiono or thio variations of benzoyl ureas are compounds where either one of, or both of the oxygens present on the benzoyl group or the urea are replaced with a sulfur.

The patent claims are written as generic formula claims; that is, a generic chemical formula is set forth in lieu of a specific compound. The formula for each of the patents in suit is identical: FN4

FN4. This depiction of the molecule is somewhat fuzzy because it was scanned into the computer from the patent itself; the other depictions were generated by the computer.

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See Claim 1 of the of the '044, '151, and '064 patents, Pl.'s Br.App. A-C.

Legal Issues

Claim construction is "the process of giving proper meaning to the claim language," the fundamental process that "defines the scope of the protected invention." Abtox, Inc. v. Exitron Corp., 122 F.3d 1019, 1023 (Fed.Cir.1997). Because the scope of a claim is necessarily determined by the language of the claim, claim construction analysis must start with these words. Teleflex, Inc. v. Ficosa North America Corp., 299 F.3d 1313, 1324 (Fed.Cir.2002); Markman v. Westview Instr., Inc., 52 F.3d 967, 976 (Fed.Cir.1995), *aff'd,* 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996). The words used in the claims are interpreted in light of the intrinsic record evidence, including written description, drawings, and the prosecution history, if in evidence. Teleflex, 299 F.3d at 1324. Absent an express intent to impart a novel meaning to claim terms, there exists a "heavy presumption" that a claim term carries its ordinary and customary meaning. Id. at 1325; *see also* Abbott Labs. v. Novopharm Ltd., 323 F.3d 1324, 1330 (Fed.Cir.2003) (allowing the entry of a definition of a claim term other than its ordinary and customary meaning where the patentee "has chosen to be his or her own lexicographer by clearly setting forth an explicit definition for a claim term").

The ordinary meaning of a claim term may be divined by reviewing a variety of sources, including the claims themselves, other intrinsic evidence including the written description and the prosecution history, and extrinsic evidence such as dictionaries and treatises. Teleflex, 299 F.3d at 1325 (citations omitted). Among all types of intrinsic evidence, courts have indicated that the specification is the "single best guide to the meaning of a disputed term." Vitronics, Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed.Cir.1996).

While a claim must be read in light of its specification, particular formulations or examples appearing in the specification may not be read to limit the claim. Advanced Cardiovascular Sys., Inc. v. Scimed Life Sys., Inc., 261 F.3d 1329, 1338-39 (Fed.Cir.2001); Transmatic, Inc. v. Gulton Indus., Inc., 53 F.3d 1270, 1277 (Fed.Cir.1995).

Conversely, the specification must not be read in any manner to expand the scope of the claim beyond the plain language of the claim. Novo Nordisk of N. Am. v. Genentech, 77 F.3d 1364, 1369 (Fed.Cir.1996); Transmatic, Inc., 53 F.3d at 1278. In all cases, however, the ordinary meaning must be determined from the standpoint of a person of ordinary skill in the relevant art. Teleflex, 299 F.3d at 1325.

"Extrinsic evidence consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." Markman, 52 F.3d at 980. In its discretion, a court may receive extrinsic evidence to aid in understanding the patent. *Id*. However, if the meaning of the claim terms is unambiguous, and the court can determine that meaning from the intrinsic evidence, it need not rely on extrinsic evidence in construing the claim. Vitronics, Corp., 90 F.3d at 1583.

Intrinsic Evidence

We turn first to the language of the claims themselves. As explained above, Claim 1 of the '044, '151, and '064 patents set forth the same generic formula:

The patents go on to further define each lettered item in the formula. Certain lettered items, "A," "B," "X," "Y," "R," "$R_{1,}$" and "$R_{2,}$" have variable meanings, i.e., the identity of each item varies according to the parameters provided by the patent for each item. Other lettered items, "C" and "N," have fixed meanings. "C" is the symbol for the element carbon, and "N" is the symbol for the element nitrogen. The only item or patent claim term whose meaning the parties dispute is "$R_{2.}$" Pl.'s Br. p. 11; Defs.' Resp. p. 17.

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Claim 1 of each of the '044, '151 and '064 patents provides that "R_2 is a substituted or non-substituted phenyl group [...]; with the proviso that the compound is not included in either [any] of the following paragraphs [...]." Claims 2 and 3 of the '064 patent state that "R_2 represents an unsubstituted phenyl group or a phenyl group substituted with from 1-3 substituents selected from the group consisting of [...]." Claim 4 of the '064 patent removes the possibility that R_2 can be an unsubstituted phenyl group and requires that "R_2 represents a phenyl group substituted with 1-3 substituents selected from the group consisting of [...]." The term common to each of these claims, "substituted phenyl group," is the term over which the parties disagree and which the court must thus construe.

Substituted phenyl group, by itself, refers to the possibility that one to five hydrogen atoms on the phenyl group may be replaced, or substituted, at one to five positions by another atom or group of atoms. The number of possible substituted phenyl groups is infinite. Pl.'s Br.App. D, Lipton Decl. para. 31. To determine what the term substituted phenyl group means in the context of the patents in suit, the parties agree that the specification common to all of these patents defines R_2 as it is used in Claim 1 of the '044, '151, and '064 patents.FN5 *See* Vitronics, Corp., 90 F.3d at 1582 (teaching that the specification is the "single best guide to the meaning of a disputed term"); Pl.'s Br. pp. 15-17; Defs.' Resp. pp. 17-18. Located in Column 2 of each patent, the specification states:

FN5. Dow, the plaintiff in this action, has asked the court to construe the term "substituted phenyl group" as it appears six times in the patents in suit: Claim 1 of the '044, '151, and '064 patents, Claim 2 of the '064 patent, Claim 3 of the '064 patent, and Claim 4 of the '064 patent. Our discussion will focus on the term "substituted phenyl group" as it is used in Claim 1 of all three patents in suit; we will then apply a consistent construction of "substituted phenyl group" to Claims 2-4 of the '064 patent.

If R_2 is a substituted phenyl group, the phenyl group contains at least one substituent chosen from the group consisting of:
a) 1-3 halogen atoms,

b) 1-2 alkyl groups, possibly substituted with halogen, hydroxy, alkoxy, alkylthio, dialkyl amino alkylsulphonyl and phenyl,

c) tri- or tetramethylene,

d) a cycloalkyl group, possibly substituted with halogen or cyano,

e) 1-2 nitro groups or cyano groups or alkoxy groups,

f) a ioxymethylene or dioxyethylene group,

g) an acyl group, which may be substituted with halogen,

h) an alkyl sulfonyl, phenyl sulfonyl, alkylthio, phenylthio or phenoxy group, which groups may be substituted with halogen,

i) a sulfonamide group, which may be alkylated, and

[j not used]

k) a phenyl group, which may be substituted with halogen, nitro, cyano and halogenated alkyl.

Specifically, the parties dispute the meaning of the phrase: "the phenyl group contains at least one substitutent chosen from the group consisting of: [...]." According to Dow, the disputed phrase means that the phenyl group contains at least one substituent (and up to five), all of which must be chosen from the enumerated group (a)-(k). Defendants, on the other hand, contend that the "language of the asserted claims ... is clear on its face to one of ordinary skill in the art." Thus, someone with a bachelor's degree in Chemistry FN6 would immediately understand the disputed phrase to mean that only one substituent must be selected from the list (a)-(k), but that any other substituents are unlimited and unbounded. Because Dow offered credible expert evidence to rebut Defendants' contention, and because the grammar of the language at issue is susceptible to two plausible interpretations, we disagree with Defendants that the claim language is clear on its face and undertake the following claim construction analysis.

FN6. In this case, the parties agree that one of ordinary skill in the art means a person with a bachelor's degree in Chemistry. Def.'s Resp. Br. at p. 17, 530 F.2d 1342 (citing Pl.'s App. D at para. 33).

The enumerated list (a)-(k) in Column 2 of each specification constitutes a "Markush group." We accept the well-known use of that term to mean that "members of the Markush group are ... alternatively usable for the purposes of the invention." In re Driscoll, 562 F.2d 1245, 1249 (C.C.P.A.1977). Moreover, "[a] Markush group, incorporated in a claim, should be 'closed,' i.e., it must be characterized with the transition phrase "consisting of," rather than "comprising" or "including." " ' Abbott Labs. v. Baxter Pharm. Prod., Inc., 334 F.3d 1274, 1280-81 (Fed.Cir.2003) (citing Stephen A. Becker, Patent Applications Handbook s. 2:17 (9th ed.2000)).

Generally, "members of the Markush group are used singly." *See Meeting Held to Promote Uniform Practice In Chemical Divisions,* 28 J. Pat. & Trademark Off. Soc'y 849, 852 (1946) (listing practices approved by the primary examiners of the USPTO's chemical group). If a patentee desires to use or to combine multiple members of the Markush group, then he or she must add qualifying language to the claim. Abbott Labs., 334 F.3d at 1281 (citing *Meeting Held to Promote Uniform Practice In Chemical Divisions, supra,* at 852). An example of such qualifying language is "at least one member of the group." *Id.* Therefore, in our case, the language "at least one" and "chosen from the group consisting of" in our judgment modifies the word substituent, allowing the patentee to select more than one substituent from among the Markush group.

Next, we examine the meaning of the pivotal word, "contains." Defendants argue that "contains," like the transitional term, "containing," "is inclusive or open-ended and does not exclude additional, unrecited elements or method steps." Manual of Patent Examining Procedure ("M.P.E.P.") s. 2111.03; Defs.' Resp., Ex. 1, Forstner Decl. para.para. 47-48. Thus, Defendants contend that "a recitation in a claim that a compound 'contains' a substituent means that the presence of that substituent with or without any other substituent(s) meets the requirement of the claim." Defs.' Resp. at p. 18, n. 7. Dow, on the other hand, asserts that "contains" should be read together with "at least one" to modify "only the word substituent, thus signifying that the number of substituents is open, i.e., that there could be as few as one substitution and as many as five." Dow then goes on to reason that the language "group consisting of" is drafted in the standard closed language of a Markush group, signifying "that the identity of any and all substituents is closed. 'Contains at least one,' under this interpretation, does not serve to make open-ended what is otherwise understood to be a closed group." Pl.'s Reply Br. on Claim Constr. at p. 7.

Dow's construction of the disputed language gives meaning to all of the words in Column 2 of the common specification, including the numerical ranges for the substituents listed at a, b, and e of the specification. *See* Unique Concepts, Inc. v. Brown, 939 F.2d 1558, 1562 (Fed.Cir.1991) (adhering to the rule that "[a]ll the limitations of a claim must be considered meaningful"); *see also* Advanced Communication Design, Inc. v. Premier Retail Networks, Inc., 46 Fed. Appx. 964, 980-81 (Fed.Cir.2002) ("[T]he construction of any legal document-like a statute, contract or patent-should try to give meaning to every term in that document; otherwise, a lawyer or court will have erred by reading the chosen words of the document into oblivion."). Because of this, we find Dow's reasoning compelling.

To say, as Defendants do, that the definition of R_2 is so broad as to include a substituted phenyl group with 4-5 halogen atoms even though the specification explicitly provides for the substitution of only 1-3 halogen atoms renders the "1-3" limitation surplusage. *See* Forstner Dep. at 139-41. Where, as here, the specification assigns significance to the numerical delineation of possible substituents, we import these numerical delineations into the claims as limitations. *See* Advanced Cardiovascular Sys., Inc. v. Scimed Life Sys., Inc., 261 F.3d 1329, 1339 (Fed.Cir.2001) (citing Kraft Foods, Inc. v. Int'l Trading Co., 203 F.3d 1362, 1367-69

(Fed.Cir.2000) (indicating that the claim term "protecting back panel" was limited to a "relatively stiff" panel because, in addition to other intrinsic evidence, the specification's text described the back panel in the patent's drawings as being "constructed of a relatively stiff material")); *see also* Eutectic Corp. v. Metco, Inc., 579 F.2d 1, 5-6 (2nd Cir.1978), *cert. denied,* 439 U.S. 867, 99 S.Ct. 192, 58 L.Ed.2d 177 (1978) (noting that the extent to which a court may look to specifications or examples to limit claim is to be determined on facts in each patent case).FN7

FN7. We find unpersuasive the parties' arguments based on the prosecution history and litigation involving a predecessor patent to those in suit. Dow asserts correctly that the Philips Group, the patentee, has previously taken Dow's position when interpreting a specification identical to the one in suit: "Duphar interprets the phrase in the specification "If R sub2 is a substituted phenyl group, the phenyl group contains at least one substituent chosen from the group consisting of [groups (a)-(k)]:" to mean that the enumerated substituents in groups (a)-(k), none of which include -OCF sub3, are the only possible substituents for the phenyl group. Bayer Aktiengesellschaft v. Duphar Intern. Research B.V., 738 F.2d 1237, 1243 (Fed.Cir.1984). However, the district court disagreed with the Philips Group's interpretation of the specification and the Federal Circuit failed to reach the issue. We also find unconvincing the parties' contentious views regarding German Patent No. 2,123,236.

Regarding the term "substituted phenyl group" in the common Claim 1 and the phrase "phenyl group substituted with from 1-3 substituents selected from the group consisting of [...]" in Claims 2-4 of the '064 patent, Dow asserts that Defendants are bound by their narrow construction of language in the provisos similar to the disputed claim language. Defendants, however, argue that provisos and claims serve different purposes, and therefore, that Defendants' strict construction of the proviso language should not bind them to a narrow claim construction. *Compare* Pl.'s Reply Br. p. 11 (acknowledging that the purpose of provisos is to narrow the asserted claims by excluding certain compounds previously patented from the scope of those claims) *with* Transcript of *Markman* hearing p. 59, ll. 18-19 (reciting an explanation by defense counsel of the purpose of the specification and claims: "[The patentees] were required, to the best of their ability, to identify in abstract terms what their invention was."); Forstner Decl. para. 62. Defendants construe the language of the proviso of Claim 1 of the '044 patent, which reads, "R_2 is a phenyl group substituted at *at least one* position *with* a moiety selected from the group consisting of [...]," to mean "compounds wherein *all* moieties substituted onto the R_2 phenyl group are selected from the group consisting of [...]." Defs.' Proposed Claim Constr., Ex. 2 to Defs.' Resp., p. 3 (emphasis added). This construction of this proviso, in which Defendants maintain that all of the substituents (at least one, but possibly more) must be selected from the closed group, directly conflicts with their construction of "substituted phenyl group" as it is used in the common Claim 1. In the proviso, Defendants also construe the term "with" to be a closed term, i.e., *all* substitutions must be selected from the "group consisting of." Defendants' construction of "with" in this proviso, however, contradicts their interpretation of similar language in Claim 4 of the '064 patent, which recites, "R_2 represents a phenyl group substituted *with* 1-3 substituents selected from the group consisting of [...]." (emphasis added). In interpreting Claim 4, Defendants asserted that the term "with" is open-ended and thus similar to "contains," "meaning that other substituents may be present other than those listed in the 'group consisting of,' as long as at least one substituent is from the 'group consisting of." ' We adopt Defendants' construction of the proviso and reject their construction of Claims 2-4 of the '064 patent. As Dow points out, the ordinary and customary meaning of the language in Claims 2-4 of the '064 patent requires that (1) the phenyl group may be substituted at only 1-3 positions, and (2) the substitutions must be chosen from the closed group expressly listed in each of the claims. Pl.'s Br. pp. 22-23.

Although we acknowledge that provisos perform a different role than claims and specifications in the patent prosecution process, we also recognize that Defendants should not be allowed to interpret the same term in different ways depending on how it suits their argument of the moment. As such, we weigh Defendants' construction of the language of the proviso of Claim 1 of the '044 patent in favor of Dow's construction of "substituted phenyl group" in the common Claim 1 and of the phrase "phenyl group substituted with from 1-3 substituents selected from the group consisting of [...]" in Claims 2-4 of the '064 patent.

Extrinsic evidence

Because we have determined that the plain meaning of the disputed term "substituted phenyl group" is ambiguous, we shall refer to extrinsic evidence, in addition to the intrinsic evidence just discussed, to discern its meaning. We are alert to the fact, however, that extrinsic evidence "may not be used to vary, contradict, expand, or limit the claim language from how it is defined, even by implication, in the specification or file history." Bell Atlantic Network Servs., Inc. v. Covad Communications Group, Inc., 262 F.3d 1258, 1269 (Fed.Cir.2001); *see also* Altiris, Inc. v. Symantec Corp., 318 F.3d 1363 (Fed.Cir.2003). As stated above, "[e]xtrinsic evidence consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." Markman, 52 F.3d at 980. Defendants argue that reference to any extrinsic evidence is unnecessary. In contrast, we are of the view that by consulting extrinsic evidence, we will ensure that our understanding of the patent's technology comports with the understanding of one skilled in the art. *See* Pitney Bowes, Inc. v. Hewlett-Packard Co., 182 F.3d 1298, 1308 (Fed.Cir.1999).

In support of its construction of "substituted phenyl group," Dow offers the expert testimony, in the form of deposition and declarations, of Dr. Mark A. Lipton ("Dr.Lipton"). Dr. Lipton received a Bachelor's of Science degree from Harvey Mudd College in 1981, and a Ph.D. in Chemistry from Columbia University in 1988. Since 1990, Dr. Lipton has been employed at Purdue University, first as an Assistant Professor and currently as an Associate Professor. Before joining the faculty at Purdue, where he teaches a wide range of both undergraduate and graduate organic chemistry courses, Dr. Lipton held the position of Computational Chemist at Shell Development Company. Pl.'s Br., App. 4, Lipton Decl. para.para. 1-4.

To rebut the testimony of Dr. Lipton, Defendants offer the deposition and declaration of Dr. James A. Forstner ("Dr.Forstner"). Dr. Forstner received a Bachelor's of Science degree in Chemistry from Loyola College, a Master of Science degree in Chemistry and a Ph.D. degree in Chemistry, both from Carnegie-Mellon University, and a Juris Doctor from the University of Maryland Law School. Dr. Forstner was a research chemist at DuPont for more than three years before serving in the DuPont Legal Department from June 1965 until mid-1981 and from March 1983 until August 1998. While at DuPont, he either drafted or supervised the drafting of thousands of patent applications. Ultimately, he was Corporate Counsel and lead Patent Counsel for several DuPont businesses. Upon leaving DuPont, he joined the law firm of Alston & Bird, LLP for two years as Senior Counsel. Currently, he is an intellectual property consultant and attorney. Defs.' Resp., Ex. 1, Forstner Decl. para.para. 1-4, 6.

Dr. Lipton testified that every one of the exemplary compounds disclosed in the patents falls within the scope of Column 2 as constructed by Dow. *See* Lipton Dep. at 204. However, "substituted phenyl group" as interpreted by Defendants would include an infinite number of chemical variations. Defendants' assertion of such a limitless property interest falls of its own weight. *See* 3 Donald S. Chisum, *Chisum on Patents* s. 8.06[1][b][ii] (2003) ("Claim drafters prefer to avoid closed claims unless the nature of the invention is such

as to require such restriction to avoid undue breadth. (Chemical compounds are often of this nature.)")

Dr. Forstner criticizes Dr. Lipton for failing to explain how one skilled in the art of chemistry would be unable to understand the claim terms, which he believes to have a "clear, well-known, and ordinary meaning." Defs.' Resp., Ex. 1, Forstner Decl. para. 37. On the one hand, he argues that "substituted phenyl group" is a generic term used in many patent claims, including those unrelated to this technology or this lawsuit. *Id*. para. 37 n. 2. On the other hand, he states that the patents themselves provide clues to one of ordinary skill in the art as to the meaning of substituted phenyl group as used in these patents. For example, the Abstract of the '064 patent broadly defines the term as having halogen, nitro, cyano, or halogenated alkyls. Thus, Dr. Forstner reasons "these substituents and similar chemically related substituents would be expected by those skilled in the art of preparing insecticides to be suitable for use in the claimed compound." Id. para. 38.

We note, first, that the term at issue must be viewed from the perspective of one skilled in the art of chemistry, not necessarily in the art of producing insecticides. In addition, Dr. Forstner does not discuss how or whether the substituents broadly defined in the Abstract, like the numerous exemplary compounds disclosed throughout the patent, would fit into Dow's proposed construction of "substituted phenyl group." Nor does he address Dr. Lipton's concerns with regard to the ability of a chemist to predict the solubility properties, stability, toxicity, potential for explosion, and fate in the environment of "similar chemically related" substituents. We conclude from the evidence before us that while Dr. Forstner is a very credible expert in patent law, Dr. Lipton presents the Court with more compelling testimony regarding the patent technology as viewed from the perspective of one skilled in the art of chemistry.

Although, at this claim construction stage of the litigation, issues of infringement and validity are not yet before us, Defendants' unbounded interpretation of "substituted phenyl group" raises questions of validity under 35 U.S.C. s. 112.FN8 The Federal Circuit speaks frequently of "the familiar axiom that claims should be [ ] construed, if possible, as to sustain their validity," with the caveat that courts should not rewrite claims to preserve validity. Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898, 911 (Fed.Cir.2004) (quoting Rhine v. Casio, Inc., 183 F.3d 1342, 1345 (Fed.Cir.1999)).

FN8. 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 of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention. 35 U.S.C. s. 112
In Generation II Orthotics Inc. v. Med. Tech. Inc., 263 F.3d 1356 (Fed.Cir.2001), the Federal Circuit explained that "claims can only be construed to preserve their validity where the proposed claim construction is 'practicable,' is based on sound claim construction principles, and does not revise or ignore the explicit language of the claims. Id. at 1365. As discussed above, the interpretation of "substituted phenyl group" we adopt is practicable and based on sound claim construction principles. Further, our construction of the disputed language also tends to preserve the patent's validity.

"The requirement [under s. 112] that the claims 'particularly point [ ] out and distinctly claim[ ]' the invention is met when a person experienced in the field of the invention would understand the scope of the subject matter that is patented when the claim is read in conjunction with the rest of the specification."

Medical Instrumentation and Diagnostics Corp. v. Elekta AB, 344 F.3d 1205, 1211 (Fed.Cir.2003) (citing S3, Inc. v. nVIDIA Corp., 259 F.3d 1364, 1367 (Fed.Cir.2001)). Dr. Lipton explains, convincingly in our view, that one skilled in the art of chemistry would need to know the number, nature, and position of the substituents in order to predict the solubility properties, stability, toxicity, potential for explosion, and fate in the environment of the patented compound. Lipton Supp. Decl. para. 9. Defendants' proposed claim construction fails to provide this necessary guidance. *See also* Roberts Dairy Co. v. U.S., 208 Ct.Cl. 830, 530 F.2d 1342, 1352 (Ct.Cl.1976) (concluding that a patentee is bound by his specification in interpreting his patent claims even when his specification requires a narrower interpretation of the claims than the patentee desires).

Conclusion

For the foregoing reasons, we conclude that the proper construction of the disputed terms of the patents in suit is as follows:

Claim Term	*Definition*
"substituted phenyl group" [Claim 1 of the '044, '151 and '064 patents]	a phenyl group that is substituted at 1-5 positions where any and all substitutions must be chosen from the group consisting of: a) 1-3 halogen atoms, b) 1-2 alkyl groups, possibly substituted with halogen, hydroxy, alkoxy, alkylthio, dialkyl amino alkylsulphonyl and phenyl, c) trior tetramethylene, d) a cycloalkyl group, possibly substituted with halogen or cyano, e) 1-2 nitro groups or cyano groups or alkoxy groups, f) a dioxymethylene or dioxyethylene group, g) an acyl group, which may be substituted with halogen, h) an alkyl sulfonyl, phenyl sulfonyl, alkylthio, phenylthio or phenoxy group, which groups may be substituted with halogen, i) a sulfonamide group, which may be alkylated, [j

	not used] and k) a phenyl group, which may be substituted with halogen, nitro, cyano and halogenated alkyl
"a phenyl group substituted with from 1-3 substituents selected from the group consisting of from 1-3 halogen atoms, a C_{1-15} alkyl group, a halogenated C_{1-15} alkyl group, a phenyl substituted C_{1-15} alkyl group, a cycloalkyl group, a halogenated cycloalkyl group, a cycloalkyl group, a halogenated cycloalkyl group, a nitro group, a cyano group, a phenyl group, a thiophenyl group, a benzoyl group, a thioalkyl group or an alkyl sulfonyl group"	a phenyl group that may be substituted at 1-3 positions where any and all substitutions must be selected from the closed group consisting of: 1-3 halogen atoms, a C_{1-15} alkyl group, a halogenated C_{1-15} alkyl group, a phenyl substituted C_{1-15} alkyl group, a cycloalkyl group, a halogenated cycloalkyl group, a nitro group, a cyano group, a phenyl group, a thiophenyl group, a benzoyl group, a thioalkyl group or an alkyl sulfonyl group
[Claim 2, '064 patent]	
"a phenyl group substituted with a[sic] from 1-3 substituents which have been selected from the group consisting of 1-3 halogen atoms, a C_{1-15} alkyl group, a halogenated C_{1-15} alkyl group, a phenyl substituted C_{1-15} alkyl group, a cycloalkyl group, a halogenated cycloalkyl group, a nitro group, a cyano group, a phenyl group, a thiophenyl group, a benzoyl group, a thioalkyl group or an alkyl sulfonyl group.	Same construction as Claim 2, '064 patent.

[Claim 3, '064 patent]	
"a phenyl group substituted with 1-3 substituents selected from the group consisting of 1-3 halogen atoms, a C_{1-15} alkyl group, a halogenated C_{1-15} alkyl group, a phenyl substituted C_{1-15} alkyl group, a cycloalkyl group or a halogenated cycloalkyl group"	a phenyl group that may be substituted at 1-3 positions where any and all substitutions must be selected from the closed group consisting of: 1-3 halogen atoms, a C_{1-15} alkyl group, a halogenated C_{1-15} alkyl group, a phenyl substituted C_{1-15} alkyl group, a cycloalkyl group or a halogenated cycloalkyl group.
[Claim 4, '064 patent]	

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