

Probe into Amendments to Markush Formula Compound Claims by Deletion and Protection Thereof

Wang Jingchao

I. Introduction

In recent years, some invalidation and adjudication cases have triggered, within the IP community, discussion over the issue of whether technical solutions a Markush claim encompassing compounds of general formula (hereinafter referred to as Markush formula compound claim) are a whole technical solution or a plurality of technical solutions in parallel. This article attempts to further explore the Markush formula compound claims on the basis of the prevailing views of the IP community, in the hope of providing some suggestions on amendments to a Markush formula compound claim by way of deletion during the invalidation stage, as well as sharing some thoughts and ideas about the protection of Markush compounds.

II. Current views within IP community

Regarding technical solutions of Markush formula compound claims, there exist two opposing views within the IP community. These two views, referred to herein respectively as the whole technical solution perspective and the parallel technical solutions perspective, are briefly described as follows.

1. Whole technical solution perspective

This view holds that the Markush formula compound claim represents a form of drafting in a highly generalised manner that they should not be regarded as a collection of technical solutions of specific compounds in parallel. Details on the reasons for asserting this view can be found in the article titled "Nature of Markush Claims and Amend-

ment thereto in Invalidation Proceedings from Perspective of a Series of Lawsuits"¹, main points of which are outlined as follows:

(1) A Markush formula compound claim is a whole technical solution and should not be equated with a collection of technical solutions of specific compounds in parallel. Figuratively speaking, if a specific compound is likened to a ping pong ball, a Markush formula compound claim is not these ping pong balls piled together.

(2) As judged from the examination criteria for novelty and inventive step as well as the selection and use of prior art for Markush claims, the technical solutions of the Markush formula compound claim should not be regarded as technical solutions in parallel.

(3) Judging from the cases of the Boards of Appeal of European Patent Office involving verification of priority right for Markush formula compound claims², a Markush formula compound claim, which contains four specific compounds only, is not equivalent to four specific compounds in the assessment of priority right and novelty.

(4) A Markush formula compound claim should be regarded as a whole technical solution given that it can be amended by way of disclaimer^{3,4}.

(5) The technical solutions of a Markush formula compound claim are not made of parallel technical solutions in light of Article 26.4 of the Patent Law.

(6) Allowing deletion of definitions of some substituents from an independent claim may result in unpredictability of protection scope and lack of the public notice function of claims.

2. Parallel technical solutions perspective

This view regards a Markush compound as a collection of independent compounds, which are parallel alternatives that can be interchanged for attaining the same effect. The article titled "A Study on Amendment to Markush Claims in Invalidation Proceedings"⁵ has a detailed discussion of the grounds for such perspective on the Markush formula compound claim, which are described in brief as follows:

(1) In light of the definition for Markush claims in the Guidelines for Patent Examination, a Markush claim is made of a plurality of technical solutions in parallel.

(2) It will be in conflict with the provisions of the Guidelines for Patent Examination on unity requirement if a Markush formula compound claim is not regarded as a collection of parallel technical solutions.

(3) In terms of balance of interests, it will be unfair to the patent holder if, according to the whole technical solution perspective, no alternatives of a substituent are allowed to be deleted after the grant of a patent; furthermore, such amendment by deletion causes no damage to the public interest by its reduction of the protection scope of a patent.

(4) The whole technical solution perspective may force patent applicants to divide a Markush formula compound claim into hundreds of claims so as to avert the risk of a Markush formula compound claim being invalidated as a whole, thus adding burden to patent application and examination.

The said two views, though different in areas of concerns and focuses, both intend to allow a Markush formula compound claim to attain a reasonable scope of protection that is commensurate with the inventor's contribution to the society while causing no prejudice to the public interest. What is reassuring is that in current practice of affirmation of patents involving Markush formula compound claims, the issues are not addressed in a rigid and mechanical manner when it comes to the interpretation of the nature of Markush formula compound claims and the principles of amendment to such type of claims. For instance, in case of a simple Markush formula compound claim with just a few substituents, the technical solutions of the Markush formula compound claim are recognised as a plurality of or a collection of parallel technical solutions; moreover, deletion from a compound of general formula the salts, esters, solvents, or analogues thereof is regarded as deletion of parallel technical solutions.

III. Understanding of Markush formula compound claim in the sense of Patent Law

In this section we will attempt to understand a Markush formula compound claim in the sense of the Patent Law of China from such aspects as characteristics of the Markush formula compound claim, requirement on unity of invention, provisions regarding amendment to the Markush formula compound claim, divisibility of the Markush formula compound claim in assessment of novelty, verification of priority right, and identification of the same inventions, as well as invalidation proceedings and administrative litigation relating to the Markush formula compound claim in practice, in the hope of offering optimal suggestions that may provide sufficient protection for patent applications involving Markush compounds while causing no prejudice to the public interest.

1. Characteristics of Markush compounds

Markush structures have their origin in the field of chemistry. The protection scopes of Markush claims were initially confined to a limited extent, but have been expanded in an uncertain and indefinite direction following the popularisation and development of the Markush formula compound claim as a drafting form for claims containing compounds. And such expansion is allowable under certain conditions in the realm of patents. The purpose behind is to provide maximal protection for the interests of patent applicants, mainly by preventing others from unduly stealing the applicant's accomplishments without creative labour by means of merely minor alteration of the claimed active compounds on the basis of the inventive concept of the inventor in an attempt to circumvent the patent of the inventor.

Markush compounds are characterised principally by its high generality, which renders a Markush claim embodying a vast number of compounds. Such high generality of Markush compounds has its specificity in that the individual units encompassed in the compounds are in some way related, but non-sequential, or in other words, independent of each other. The units in the Markush compounds may be indefinite in number, but are obviously different from those representing the numerical ranges for temperature or pressure, with the latter being sequential, indivisible, and indefinite in number. This disparity in generic concepts leads to difference in treatment of some substantial issues during

the examination process, which eventually affects the extent of patent protection and construction of patent claims. Although a Markush compound may cover massive specific compounds, it does not mean that all the specific compounds therein have been disclosed in the relevant patent application. The complexity resulted from this form of drafting brings certain specificities to patent validity and protection of the applications concerned.

2. Divisibility and juxtaposition of Markush compounds in the context of unity requirement

In patent-related laws of many jurisdictions, Markush formula compound claims tend to be first mentioned under the section on unity of invention. According to the Guidelines for Patent Examination of China⁶, a Markush claim is formed by definition of a plurality of parallel alternative elements in the claim. Markush elements are parallel alternative elements of similar nature that are regarded as technically related and having the same or corresponding special technical features. A Markush formula compound claim is required to satisfy the requirement on unity of invention in the Patent Law and the Implementing Regulations thereof.

The unity issue as related to the Markush formula compound claim is an extremely complicated one, and differs from country to country in stipulation and in practice. But it is generally acknowledged among various jurisdictions that Markush formula compound claims are beset with the issue of unity.

To overcome the unity defect in the Markush formula compound claim, a major way is to amend the claim by deleting one or more types of compounds which are not in conformity with the unity requirement from the definitions for the Markush compounds, that is, deleting some of the parallel technical solutions, and filing the deleted technical solutions as a divisional application where necessary. Such deletion is made possible by the divisibility and parallel nature of Markush compounds.

3. Provisions related to amendment to Markush formula compound claim in Guidelines for Examination

Article 33 of the Patent Law of China entitles the patent applicant to amendment to application documents and provides for the content and scope of amendments; whereas Rule 51.1 and 51.3 of the Implementing Regulations of the Patent Law further specify the timing and manner of amendment on the basis of the said Article. We will mainly discuss herein some substantive issues concerning the amendment to Markush formula compound claims. In respect of making

amendment to Markush formula compound claims, the following ways may be adopted:

(1) Delete a certain claim, or amend the claim so that it falls within the scope as explicitly recited in the description;

(2) Delete one or more options from the definition of respective substituents in the compounds of general formula in the claim. Such deletion represents deletion of some technical solutions and should basically be allowed. The deletion will not be allowed, however, when it results in only a few specific compounds left, such as the circumstances referred to by the IP community as “1×n” or “2×2”, wherein the compounds are not explicitly recited in the originally filed application documents.

(3) Recombine specific options of groups as disclosed in the embodiments.

(4) Amend by way of disclaimer. Details about the general provisions for amendment by way of disclaimer can be found in the Examination Instructions of the State Intellectual Property Office of China⁷. “Disclaimer” in this context means the surrender, in light of the prior art, of a specific compound or a type of compound of a small scope, which is not disclosed in the original application documents, from the scope of protection claimed by a Markush formula compound claim.

The above amendments are allowed in patent examination in practice under particular circumstances⁸. In general, a Markush formula compound claim is derived by generalisation of one or more embodiments recited in the description. A common situation is, the applicant would outline a very broad scope for the Markush formula compound claim when drafting the description and claims. As a consequence, in most of the patent examinations involving Markush compounds, the scope of the compounds of general formula in the claim shall be amended by way of deletion, after taking into consideration sufficiency of disclosure on compounds in the description. In other words, deletion is directed at those substituent groups that are not supported by the embodiments. This is the most common way of amending claims containing Markush compounds, and such amendment is allowed. It can thus be seen that a Markush formula compound claim is divisible by nature and scope. Having said that, excessive deletion may give rise to a scope equivalent to a newly generalised one, and if the scope of the compound thus obtained cannot be directly and unambiguously determined by those skilled in the art from the original disclosure, the amendment will not be al-

lowed.

4. Divisibility of Markush compounds in assessment of novelty, verification of priority right, and identification of the same inventions

Novelty of an invention is usually assessed by comparison of compounds in an invention to those disclosed or mentioned in reference documents. While compounds of general formula disclosed in reference documents cannot destroy the novelty of the specific compounds in an invention, specific compounds may destroy the novelty of compounds of general formula. In general, compounds of general formula disclosed in the prior art cannot destroy the novelty of compounds of general formula in an invention⁹. However, if the compounds of general formula are deemed to have specifically disclosed or “mentioned” specific compounds, they may destroy the novelty of the compounds of general formula in an invention¹⁰. Where one or more specific compounds in the reference documents destroy the novelty of the compounds of general formula in an invention containing the specific compound(s), novelty of the compounds of general formula in the invention may still be secured by way of exclusion or surrender of the disclosed specific compounds depending on practical situation. This shows that when assessing novelty, the compounds of general formula in the reference documents generally are indivisible or are divisible only to a limited extent, whereas the compounds of general formula in an invention are usually divisible.

For the verification of priority right, the divisibility of compounds of general formula may affect whether the right of priority is tenable. The right of priority is verified by comparing the compounds of general formula in an application with those of an earlier application to see whether the two pertain to inventions of the same subject matter, so as to determine whether the application can enjoy the priority of the earlier application. When assessing whether the compounds of general formula are eligible for a right of priority, taking the compounds as divisible is more in line with the provision for “partial priority” in paragraph F of Article 4 of the Paris Convention for the Protection of Industrial Property. If division of the compounds of general formula is not allowed, on the one hand, it means the applicant is not allowed to supplement any technical solutions on the basis of an earlier application, thus excluding an improved invention from enjoying the right of priority, which will not be in compliance with the legislative intent of partial priority, and on the

other hand, it gives rise to an ever-changing status as regards whether the claim of a subsequent application is eligible for the right of priority in the process of amendment, which will generate a state of legal uncertainty and unpredictability.

As for the assessment of identical inventions, it is conducted by comparing a claim of a patent application or a patent with a claim of another patent application to decide whether they belong to the same invention for the purpose of avoiding double patenting. In examination practice, where there is only a single technical solution in the claim, comparison can be made to the technical solution directly. Where the claim contains several parallel technical solutions that can be divided clearly, which is not substantially different from drafting the technical solutions separately as several parallel claims, comparison can be made separately. For a claim containing compounds of general formula in parallel technical solutions, it is usually regarded as a whole technical solution when assessing the identicalness of inventions, that is, the claim is not divided under such circumstances.

The foregoing shows that in the assessment of novelty, the compounds of general formula in the reference documents are indivisible, whereas those in an invention are divisible; in the verification of priority right, the compounds of general formula in the earlier application and those in the later application are both divisible; and in the assessment of identicalness of inventions, both the compounds of general formula in a patent application or a patent and those in the reference documents are indivisible. It can thus be seen that divisibility of the compounds of general formula is dependent on the context as well as the legislative intent.

For detailed exploration of the issue concerning divisibility of technical solutions containing compounds of general formula as the aforesaid, reference can be made to the article titled “A Probe into Divisibility of Compounds of General Formula”¹¹.

5. Markush formula compound claim in invalidation proceedings and administrative litigation in practice

In recent years, the Patent Reexamination Board (PRB) of the State Intellectual Property Office of China issued some invalidation decisions¹² regarding whether the technical solutions of Markush claims can be amended by way of deletion. In some early decisions, such as invalidation decisions No. 9197 issued on 18 December 2006 and No. 9323 issued on 22 December 2006, deletion of Markush ele-

ments (i.e., groups in the substituent definitions) from the Markush claims was allowed, and such deletion was considered deletion of parallel technical solutions from the claims. However, in some subsequent invalidation decisions, such as invalidation decisions No. 12729 issued on 10 December 2008, No. 16241 issued on 20 March 2011, and No. 16266 issued on 21 March 2011, the PRB did not deem the Markush formula compound claim as parallel technical solutions, but instead as an organic whole, and hence rejected the patentees' amendments to the Markush formula compound claim by deletion of Markush elements from the claims. Later on, in three judgments of cases undergoing administrative litigation, the Beijing No.1 Intermediate People's Court and the Beijing Higher People's Court gave explicit opinions regarding the amendment by deletion of a Markush formula compound claim in invalidation proceedings, in which the PRB's views of disallowing deletion of Markush elements in three invalidation decisions¹³ were negated. The PRB, dissatisfied with the Beijing Higher People's Court's Judgment No. 833, filed a retrial request to the Supreme People's Court. The case is pending further trial with the court's issuance on 23 December 2015 of an administrative ruling on retrial of the case.

Under current practice in both invalidation proceedings and administrative litigation, if the scope of the claimed compounds covers a Markush compound, or a pharmaceutically acceptable salt, an ester, a solvate, an analogue, or a prodrug thereof, deletion of a technical solution in parallel with the compound of general formula, or a pharmaceutically acceptable salt, an ester, a solvate, an analogue, or a prodrug thereof, is allowed in invalidation proceedings as well as administrative litigation. On the other hand, amendment by deletion is neither accepted in invalidation proceedings nor in administrative litigation if the deletion of parallel technical solutions represented by compounds of general formula in a claim results in only one or several, or equivalent to one or several, specific compounds that are not explicitly recited in the original application documents. The divergence in opinions between the invalidation proceedings and the administrative litigation regarding deletion of parallel technical solutions mainly concerns the deletion of substituents from the definition of variables in the compounds of general formula. From the writer's analysis of the different views on amendment by deletion of a Markush formula compound claim, it is found that the balance between the interests of the patentee and those of the general

public is another issue of common concerns apart from the controversy on whether a Markush formula compound claim is made of parallel technical solutions.

IV. Suggestions on amendment to Markush formula compound claim by deletion in invalidation proceedings

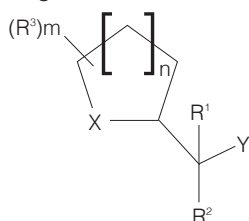
From the above attempt to understand a Markush formula compound claim in the sense of the Patent Law, we can see that Markush compounds are a collection of parallel technical solutions, and theoretically, a compound of general formula can be divided into specific compounds. Nonetheless, in the context of the Patent Law, a collection of compounds of a general formula is not identical to a collection of the respective specific compounds in juxtaposition. The allowability of amendment to a Markush formula compound claim by deletion, which is deletion of parallel technical solutions, should take into account the factors of whether the remaining technical solutions of the claims after amendment by deletion still meet other amendment requirements for patent validity as well as the conditions for patentability.

As regards amendment to a Markush formula compound claim by deletion in invalidation proceedings, the writer suggests that the amendment should be accepted if it is simple and related to deletion of only a few groups from a few substituents, wherein the deletion obviously involves one or several types of compounds. For concurrent amendments to a plurality of substituents, particularly when a plurality of groups is deleted from the definition of each respective substituents, such amendments are surely amendment by way of deletion and should theoretically be accepted in invalidation proceedings. However, to determine whether the amended scope of the claim is acceptable, factors of consideration would include, first, the workload of examiners, who may need to spend tremendous efforts in conducting renewed searches and examining whether the new protection scope satisfies the conditions for patentability under the Patent Law, and, second, public recognition of the scopes of the claim before and after amendment, i.e., the public notice function of the claim.

In the following we will provide a model of a Markush claim along with some scenarios to facilitate readers' understanding of the writer's suggestions on amendment to a

Markush formula compound claim by way of deletion.

Claim 1: A compound of the following general formula ¹⁴, or pharmaceutically acceptable salts, esters, solvates, analogues or prodrugs thereof:



wherein, m and n respectively represent 1, 2 or 3;

X represents O or S;

R³ represents H, halogen or C₁-C₈ alkyl, wherein the alkyl can be optionally substituted with C₁-C₆ alkyl, C₁-C₆ alkoxy or halogen; or R³ represents phenyl or heterocyclic radical; or two R³ together represent benzo, naphtho or heterocyclo;

R¹ and R² respectively represents H, halogen, or C₁-C₃ alkyl; and

Y represents H, halogen, -CH₂-COOH or amine.

Scenario 1: delete “or pharmaceutically acceptable salts thereof”, “or esters thereof”, “or solvates thereof”, “or analogues thereof” or “or prodrugs thereof”;

Scenario 2: delete the groups from the definition of respective substituents, so that only the following remain: “m represents 1”; “n represents 1”; “X represents O”; “R³ represents H”; “R¹ and R² respectively represent H”; and “Y represents chlorine” (equivalent to a specific compound);

Scenario 3: delete “n represents 3”;

Scenario 4: delete “X represents S”;

Scenario 5: delete “the alkyl represented by R³ can be substituted with C₁-C₆ alkyl, C₁-C₆ alkoxy or halogen”;

Scenario 6: delete “n represents 2 or 3” and “X represents S”;

Scenario 7: delete “n represents 2 or 3”; “X represents S”; “two R³ together represent benzo, naphtho or heterocyclo”; “R¹ and R² respectively represent halogen”; and “Y represents halogen or amine”.

We will now move on to analyse whether the amendments in the above scenarios are acceptable in invalidation proceedings:

Scenario 1 deletes the technical solutions in parallel with the compound of general formula, i.e., “or pharmaceutically acceptable salts thereof”, “or esters thereof”, “or solvates thereof”, “or analogues thereof” and “or prodrugs thereof”, from the protection scope of claim 1 of “a com-

pound of general formula, or pharmaceutically acceptable salts, esters, solvates, analogues or prodrugs thereof”. Under current practice, such amendment is recognised and accepted in invalidation proceedings and administrative litigation.

Scenario 2 directly limits the protection scope of claim 1 to a specific compound. At present, the PRB and the court are in line with each other on views about this kind of amendment. According to invalidation proceedings and administrative litigation in practice, if the compound is explicitly recited in the original application documents, such amendment is allowed; otherwise, it is not allowed. The general principle for this kind of amendment is that the parallel technical solutions represented by compounds of general formula should not be deleted to the extent of leaving only one or a few compounds, or equivalent to one or a few compounds, which are not explicitly recited in the original application documents.

Scenarios 3 to 6 delete only individual groups from individual substituents, with the deletion involving clearly one or several types of compounds. Such amendment is deemed as unacceptable by the PRB, while the court finds it acceptable. We suggest that such amendment should also be accepted in invalidation proceedings, as this kind of amendment is similar to the circumstances under scenario 1 in that both involve deletion of one or several types of compounds, and moreover, the protection scopes before and after amendment, as well as the amendment process, are so clear and explicit that it will not affect the public notice function of the claim.

Scenario 7 amends a plurality of substituents concurrently. This should be the scenario that causes most controversies. The mainstream view among the examiners of the PRB is that this kind of amendment is unacceptable. However, according to the afore-mentioned administrative judgments, such amendment was accepted by judges of the intermediate and high courts. In our opinions, this is certainly a case of amendment by deletion and should theoretically be accepted in invalidation proceedings. Nevertheless, the protection scope after the amendment may be a result of recombination of technical features, which is, *prima facie*, a new scope of protection. As such, the consideration factors for its allowability would include on the one hand the workload imposed on the examiners, as the examiners may need to spend tremendous efforts on conducting renewed examination to find out whether the protection scope after

amendment satisfies the conditions for patentability under the Patent Law, and on the other hand, public recognition of the scopes of the claim before and after amendment, i.e., the public notice function of the claim. For such a circumstance, it is not advisable to restrict the amendment to the Markush formula compound claim on the grounds that “technical solutions of a Markush formula compound claim are not parallel technical solutions”. Instead, it is preferable to take the exclusive approach as adopted by the Boards of Appeal of the European Patent Office, that is, the amendment should be accepted if it does not result in a scope of protection exceeding the original disclosure; or otherwise, the amendment should be refused. Meanwhile, allowability of the amendment may also be decided on the basis of whether the claim amended by deletion satisfies other conditions for patentability as stipulated in relevant laws, regulations, and rules. Regarding the amendment by recombination of technical features, some suggestions¹⁵ have been put forward to the effect of unifying the understanding on amendment to a Markush formula compound claim in the patent examination and granting procedures and in the post-grant procedures of patent affirmation.

In brief, the aforesaid amendments by deletion are advised to be treated on a case-by-case basis during the patent validity procedure, especially in invalidation proceedings, after taking into account various factors for reasonable determination of whether the amendments are acceptable.

V. Reflections on protection of Markush compounds

Markush compounds involve a complicated system, and the nature of these compounds determines the complexity and error-proneness of patent examination on them. The U.S. and some countries have arrangements in place for post-grant amendment and correction of patents, including the procedures of reissue of an original patent, correction statement, disclaimer, and retrial in the US. In China, apart from the allowance for limited amendment in invalidation proceedings, Rule 58 of the Implementing Regulations of the Patent Law also offers an opportunity for correction, which, however, can only be used by the patent administration department under the State Council. We suggest that the said opportunity for correction be extended on the basis of the said rule so that anyone who finds an error in a patent

gazette or patent pamphlet may request or inform the patent administration department under the State Council for timely correction, or going even further, the patentee may take advantage of the correction procedure to surrender part of the claims or part of the protection scope of the claims.

Moreover, we suggest that the applicant should put more efforts into drafting patent applications containing Markush claims. First, he should have an understanding of the prior art based on adequate searches when drafting the description of an invention application, with a focus on sufficient disclosure of the compounds of the invention in breadth and in depth. By “breadth”, it means sufficient disclosure of the scope of the compounds, not only in terms of all types of the compounds of the invention, but also, if desired for protection, derivatives of the compounds, such as pharmaceutically acceptable salts, esters, solvates, crystals, analogues and preparations thereof. By “depth”, it refers to disclosure of not only the identification, preparation, and use of the compounds, in particular of a certain number of embodiments on preparations for each type of compounds, but also disclosure of experimental data for the compounds, including verification data and in particular effect and usage data. Currently, it is often due to the lack of effect data as well as the restriction on supplementation of experimental data that the protection scope of compounds in the claims is significantly reduced. As data are a complex issue and acquisition thereof is costly, arduous, and time-consuming, more efforts should be devoted to the design of experiments toward preparation of a reasonable amount of the data required.

In respect of drafting of the claims, the applicant should not draft an arbitrarily broad scope of protection for a claim of general formula. The scope of protection should be appropriate and reasonable, with generalisation based on the knowledge of those skilled in the art and the actual contributions of the invention. Such a scope will be in conformity with the current examination criteria and is more likely to obtain a patent grant as well as maintain the patent rights after grant. In addition, a reasonable intermediate range should be provided as far as possible and the claim should be drafted in an inverted pyramid manner. Obviously, one of the objectives of building this layer-by-layer protection is to withstand the attack of invalidation requests. ■

The author: Attorney-at-law and patent attorney of China Patent Agent (H.K.), Ltd.

¹ Li Yue and Ni Xiaohong (2015). Nature of Markush claims and amendment thereto in invalidation proceedings from perspective of a series of lawsuits. *China Patents & Trademarks*, January 15, 2015.

² European Patent Office, *Case Law of the Boards of Appeal of the European Patent Office*, Seventh Edition, 2013, p. 345.

³ Li Yue, He Wei and Cai Lei. *Issues on amendment by disclaimer. Study of the Patent Law* (2013), 1 January 2015.

⁴ see the EPO's Boards of Appeal, G1/03.

⁵ Legal Affairs Department of China Patent Agent (H.K.) Ltd. A study on amendment to Markush claims in invalidation proceedings. *China Patents & Trademarks*, 15 July 2014.

⁶ SIPO. *Guidelines for Patent Examination 2010* published by the Intellectual Property Press in January 2010.

⁷ SIPO. Chapter 8, Section 9.3.9 of the Examination Instructions—Substantive Examination Volume 2011 published by the Intellectual Property Press in February 2011.

⁸ SIPO. Chapter 10, Section 1.8 of the Examination Instructions—Substantive Examination Volume 2011 published by the Intellectual Property Press in February 2011.

⁹ Tang Lini. Judgment on novelty of Markush-type product claims. Chi-

na IP, published on 24 April 2013.

¹⁰ SIPO. Chapter 10, Section 1.5.1 of the Examination Instructions—Substantive Examination Volume 2011 published by the Intellectual Property Press in February 2011.

¹¹ Jiang Shichao and Yao Yun (2012). Tentative study of division of compounds covered by a formula. *China Invention & Patent*, 26 December 2012.

¹² The invalidation decisions cited herein are retrieved from <http://www.sipo-reexam.gov.cn>.

¹³ The court judgments are retrieved from <http://www.court.gov.cn/zgcpwsw>, which are respectively the Beijing No.1 Intermediate People's Court's Administrative Judgment No. Yizhongzhixingchuzi 3225/2011 (hereinafter referred to as the Beijing No.1 Intermediate Court's Judgment No. 3225), the Beijing Higher People's Court's Administrative Judgment No. Gaoxingzhongzi 833/2012 (hereinafter referred to as the Beijing Higher Court's Judgment No. 833) and the Beijing Higher People's Court's Administrative Judgment No. Gaoxingzhongzi 2046/2013 (hereinafter referred to as the Beijing Higher Court's Judgment No. 2046).

¹⁴ The structure of the formula is cited from the Guidelines for Patent Examination 2010, p. 289.

¹⁵ Lou Ning and Liu Yinliang. Study of patentability of Markush-type compounds. *China Invention & Patent*, 16 March 2011.