or 3, are exempt from the rules. In the specific example given, the sequence is exempt due to the presence of the spacer in which the variable AA, which would properly be represented as Xaa, can be zero, one, two or three amino acids. In general, at a given position in a sequence, that position must be occupied by a single constituent, even though that single constituent might be a variable, such as an Xaa or an N.

- Single letter amino acid abbreviations are not acceptable anywhere in the application, including the "Sequence Listing."

- Zero (0) is not used when the numbering of amino acids uses negative numbers to distinguish the mature protein.

- Subscripts or superscripts are not permitted in "Sequence Listings." - If a "Sequence Listing" is amended, an entirely new computer readable form is required regardless of the triviality of the amendment. Amendments to the paper copy of the "Sequence Listing" must be made by substitute sheets. - Note field length limitations. For specific instances, they may be waived, but compliance is encouraged.

- The exclusive conformance requirement of 37 CFR 1.821(b) requires that any amendment of the sequence information in a "Sequence Listing" be accompanied by an amendment to the corresponding information, if any, embedded in the text of the specification or presented in a drawing figure.

- Any inquiries regarding a specific computer readable form that has been processed by the Office should be directed to the Systems Branch of the Biotechnology Division of the Scientific and Technical Information Center.

(o) Explain how your examining authority handles applications claiming protection for large numbers of chemical structures composed of nucleic or amino acid sequences. Examples might include requiring the applicant to file separate applications drawn to one or more set of such structures or imposing additional examination fees through application of a unity of invention requirement.

The PTO established its policy governing restriction practice in applications claiming multiple nucleotide sequences through a notice published on November 19, 1996 (1192 OG 68). Under this policy, the PTO will permit an applicant to claim up to ten independent and distinct nucleotide sequences in a single application. This general rule governs most applications in which many nucleotide sequences have been disclosed and claimed by the applicant.

As indicated in its public notice, the PTO recognizes that there will be situations where more or less than ten sequences will be considered by the Office in a single application. The PTO practice is based on the authority of 35 U.S.C. 121, which permits the PTO to require an applicant to divide an application claiming more than one patentably distinct invention into separate applications. As such, the PTO has indicated that it will examine those sequences claimed in an application that are notpatentably distinct from any of the ten elected sequences, and will not consider discrete sequences that encode the same protein to be independent and distinct inventions. On the other hand, the PTO envisions that there

will be exceptional cases in which the complex nature of the claimed material may necessitate that the reasonable number of sequences that may be selected for examination will be less than ten sequences.

(p) Explain any special procedures or considerations that are employed by your examining authority to search and evaluate information in the course of applying the standards of novelty and inventive step/non-obviousness to chemical structures composed of nucleic or amino acid sequences. Such procedures or considerations might include the use of computerised search systems of nucleic or amino acid sequence information, software to compare similarities between claimed sequences and prior art sequences, or presumptions relied on by examiners.

The PTO has extensive information systems and electronic information resources that are used in the course of examination of applications claiming an invention concerning to nucleotide or amino acid structures. These systems consist of three massively parallel computing systems that are able to perform rapid and extensive searches and comparisons to databases of existing published or unpublished sequence information, in addition to a number of workstations that also can be used to perform sequence comparison, analysis and evaluation. A summary of these resources is provided in Atachment E.

(q) Identify the sources which your examining authority relies upon in novelty searches e.g. applicant's disclosure, other examining authorities searches, electronic databases, academic journals, others).

The PTO relies on an incredible variety of sources of publicly available information in conducting the search and examination of patent applications. These include disclosures in published U.S. and foreign patents, scientific journals, and other sources of technical information. The PTO makes extensive use of automated search systems, including its internal Automated Patent System (APS) and commercial on-line databases. The PTO's Scientific and Technical Information Center (STIC) houses one of the world's most extensive collections of non-patent technical literature. Attachment F contains a list of the Office's current subscriptions in relation to biotechnology.

The PTO does not rely to a significant degree on search and examination reports produced by foreign offices. The principal reason for this is that PTO examiners typically conduct the initial search of an application before the foreign publication of the corresponding foreign application that serves as a basis for a claim of priority. Furthermore, even when the PTO's initial search has not been performed until after the foreign publication date, it is unlikely that the search report will be readily accessible to the PTO.

On the other hand, applications filed under 35 U.S.C. 371 (i.e., national stage applications filed under the PCT system) often do contain useful information that is used during the search and examination of the national stage filing under the PCT system. PCT search and examination reports are frequently used by the PTO examiners, either to supplement a previously performed search of a related U.S. filing or in the examination of the national stage application.

(r) Indicate in what instances a biotechnology patent may currently be granted when the patent application contains (i) functional and structural claims, (ii) only functional claims; and (iii) only structural claims?

To respond to the question posed, it should be recalled that the relevant issue in respect of "functional" claim language is whether claim limitations that are expressed or defined in "functional" terms are permitted, rather than whether functional characteristics can be claimed, per se. The invention being claimed is, of course, the central question presented for evaluation by the PTO. The US response to

the question will thus answer the question of whether claim limitations that define functional characteristics of a biological invention are permitted.

As a general matter, an applicant is permitted to define what he or she believes to be the invention in any fashion, provided that the claim as drafted complies with the requirements of 35 U.S.C. § 112 (i.e., it must clearly point out the subject matter that the applicant claims as his or her invention). As stated in MPEP 2173.01,

> A fundamental principle contained in 35 U.S.C. § 112, second paragraph is that applicants are their own lexicographers. They can define in the claims what they regard as their invention essentially in whatever terms they choose so long as the terms are not used in ways that are contrary to accepted meanings in the art. Applicant may use functional language, alternative expressions, negative limitations, or any style of expression or format of claim which makes clear the boundaries of the subject matter for which protection is sought. As noted by the Court in *In re Swinehart* , 439 F.2d 210. 160 USPQ 226 (CCPA 1971), a claim may not be rejected solely because of the type of language used to define the subject matter for which patent protection is sought.

Functional language is frequently used in claims to define features of biotechnological inventions, primarily because such characteristics often provide an effective means of defining physical characteristics or properties of biologically active substances. Thus, a protein that is defined so as to include a particular threshold activity in the context of a recognized method of measuring that activity would be a permissible element of a claim. Whether the claim as a whole satisfies the requirements of 35 U.S.C. § 112 is a question that will be evaluated considering all the relevant criteria. In short, the answer to each of the sub-questions posed is "yes, provided the claim as presented adequately defines the claimed invention."

A summary of the use of functional limitations is found in section 2173.05(g) of the MPEP, reproduced below.

> 2173.05(g) Functional Limitations
>
> A functional limitation is an attempt to define something by what it does, rather than by what it is (e.g., as evidenced by its specific structure or specific ingredients). There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. *In re Swinehart* , 439 F.2d 210, 169 USPQ 226 (CCPA 1971).
>
> A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used. A functional limitation is often used in association with an element, ingredient, or step of a process to define a particular capability or purpose that is served by the recited element, ingredient or step. Whether or not the functional limitation complies with 35 U.S.C. § 112, second paragraph is a different issue from whether the limitation is properly supported under 35 U.S.C. § 112, first paragraph or is distinguished over the prior art. A few examples are set forth below to illustrate situations where the issue of whether a functional limitation complies with 35 U.S.C. § 112, second paragraph was considered.
>
> It was held that the limitation used to define a radical on a chemical compound as "incapable of forming a dye with said oxidizing developing agent" although functional, was perfectly

acceptable because it set definite boundaries on the patent protection sought. *In re Barr* , 444 F.2d 588, 170 USPQ 33 (CCPA 1971).

In a claim that was directed to a kit of component parts capable of being assembled, the Court held that limitations such as "members adapted to be positioned" and "portions . . . being resiliently dilatable whereby said housing may be slidably positioned" serve to precisely define present structural attributes of interrelated component parts of the claimed assembly. *In re Venezia* , 530 F.2d 956, 189 USPQ 149 (CCPA 1976).

(s) Explain how your examining authority would proceed to determine whether an applicant has disclosed the invention in a manner sufficiently clear and complete for the invention to be carried out by a person skilled in the art.

The standard at issue in this question (i.e., whether the disclosure in an application supports what has been claimed as the invention by the applicant) is found in 35 U.S.C. § 112, first paragraph, which reads:

35 U.S.C. § 112 Specification.

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.

Generally speaking, the "test" that governs whether an application satisfies the enablement requirement requires an assessment of whether the claimed invention in relation to the disclosure would require a person skilled in the relevant technical area to engage in an "undue" amount of experimentation to practice the invention. The factors that influence this determination were articulated in the case of*In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988), and are summarized in the PTO examination guidelines for application of section 112 as follows:

In making the determination of enablement, the examiner shall consider the original disclosure and all evidence in the record, weighing evidence that supports enablement against the evidence that the specification is not enabling.

In the mid-1800's the Supreme Court reasoned that a specification would be defective if it required one with skill to "experiment" in order practice the claimed invention. Wood v. Under Hill, 46 U.S. (4 How.) 1 (1847). The standard for determining whether the specification met the enablement requirement was recast in the later Supreme Court decision of Mineral Separation v. Hyde, 242 U.S. 261, 270 (1916) which postured the question: is the experimentation needed to practice the invention undue or unreasonable? That standard is still the one to be applied. In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988). Accordingly, even though the statute does not use the term "undue experimentation," it has been interpreted to require that the claimed invention be enabled so that any person skilled in art can make and use the invention without undue experimentation. In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988).

There are many factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any necessary experimentation is "undue." These factors include, but are not limited to:

- the breadth of the claims,
- the nature of the invention,
- the state of the prior art,
- the level of one of ordinary skill,
- the level of predictability in the art,
- the amount of direction provided by the inventor,
- the existence of working examples, and
- the quantity of experimentation needed to make or use the invention based on the content of the disclosure. In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988) (reversing the PTO's determination that claims directed to methods for detection of hepatitis B surface antigens did not satisfy the enablement requirement).

In Wands, the court noted that the there was no disagreement as to the facts, but merely a disagreement as to the interpretation of the data and the conclusion to be made from the facts. In re Wands, 858 F.2d at 736-40, 8 USPQ2d at 1403-07. The court held that the specification was enabling with respect to the claims at issue and found that "there was considerable direction and guidance" in the specification; there was "a high level of skill in the art at the time the application was filed;" and "all of the methods needed to practice the invention were well known." Id. at 740, 8 USPQ2d at 1406. After considering all the factors related to the enablement issue, the court concluded that "it would not require undue experimentation to obtain antibodies needed to practice the claimed invention." Id., 8 USPQ2d at 1407.

(t) Explain how your examining authority has proceeded where no specific details concerning the practice of the invention are provided in the disclosure, but where a person skilled in the art could practice the invention using known techniques and without an undue amount of experimentation.

In general, see response provided in question (i) and (s) above.

In the situation where no specific details concerning the practice of a biotechnological or any other invention, the question is whether the disclosure would enable a person skilled in the relevant art to practice the claimed invention without resort to undue experimentation. The specific scenario described in the question is referred to as a “prophetic” patent application. Nothing precludes the grant of a patent on a prophetic application, provided the application complies with the substantive requirements under 35 U.S.C. § 112.