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Innovators should consider whether trade secret protection is a more appropriate method for protecting their sustainable process technology compared with patents.

Sustainable patenting

Sustainable chemistry – also known as green chemistry – seeks to minimise or eliminate the use and generation of hazardous substances. For example, innovators may develop a sustainable synthetic route to a chemical that is traditionally prepared from petrochemical feedstocks.

Intellectual Property (IP) protection is used as a commercial tool by innovators to facilitate a return on their investment. Patents are commonly used within chemical technologies to protect inventions, which may be products or processes. But how is IP protection, such as patents, being used by innovators in the sustainable chemistry space?

David J. C. Constable has conducted an analysis of granted US patents to determine the extent to which sustainable chemistry research is being translated to commercial applications (*ACS Sust. Chem. & Eng.*, doi: 10.1021/acssuschemeng.0c05496). He found that of 882,823 US patents granted from 1990 to 2019, only 1.4% (12,473 patents) related to sustainable chemistry.

So, is it possible for innovators in the sustainable chemistry space to seek IP protection for their developments? And are there particular challenges when seeking to protect the results of sustainable chemistry innovation? Questions that innovators should be asking include:

1. *Is the product of my sustainable process patentable?* Patent owners may prefer to have a patent that protects their product, eg a compound, an additive, a formulation, rather than their synthetic process. It is often easier to enforce a product patent than a process patent.

A chemical product prepared via a sustainable process may be indistinguishable from chemical products already on the market that are derived from petrochemical feedstocks. Patents are only granted for inventions that meet the requirement of novelty, ie there must be something different about your product compared with products that are already in the public domain. If your sustainable chemistry route provides exactly the same product as known processes, then product patents will not be an option.

The innovator should assess whether there are any measurable differences between the sustainable product and the product already on the market, eg does the sustainable product have a different impurity profile? Such differences are an important first step when seeking to establish whether the sustainable product is patentable.

2. *Is my sustainable process patentable, and is it possible to enforce a patent protecting my sustainable process?* Another patentability

requirement is inventive step. An invention has an inventive step if it is non-obvious to the skilled person, based upon knowledge of products and processes that are already in the public domain. If a sustainable process is fundamentally similar to petrochemical processes that are already in the public domain, then it may be difficult to establish that the differences in the process steps would not have been obvious to the skilled person. However, if there are process steps that are different, eg using different reagents or reaction conditions to those in known processes, then it may be possible to obtain a process patent, particularly if there is a technical benefit, eg reduced emissions or improved yield associated with the difference.

Process patents allow the patent owner to prevent competitors from carrying out the patented process. However, care should be taken to ensure that the patent claims the process as it is carried out commercially. If the patented process has multiple steps, are they all carried out in one country? If the product of the process is imported/exported, does the patented process cover all steps to the commercial product?

It is also important to consider how easy it will be to prove that competitors are using the patented process. Will this be possible from publicly available information, eg information provided in safety data sheets or to regulatory authorities? Or will it only be possible to obtain such evidence via legal means, eg after initiating infringement proceedings before a court?

3. *Is it possible to protect my sustainable chemistry developments using trade secret protection?* Innovators should consider whether trade secret protection is a more appropriate method for protecting their sustainable process technology, compared with patents. Trade secret protection can be effective if robust procedures are in place to ensure that the relevant information does not become publicly available.

A potential risk of relying on trade secret protection is that competitors may file their own patents on similar technology, and this could potentially affect an innovator's ability to use their own, secret, technology. Patent systems typically have provisions whereby innovators are entitled to continue using technology that they have developed, but these provisions are limited and may not allow an innovator to scale-up or expand their proprietary technology.

IP protection is available for innovation in the sustainable chemistry space. Innovators should carefully consider if and how IP rights can be used to support their commercial objectives.