

Introduction

The 2023 paper concerned a photoreactor bag apparatus for growing algae. Although the subject matter was quite different to previous years, the general concept appears to have been understood by the majority of candidates.

This year, the main challenge was to prepare a set of claims, including an independent claim covering both described embodiments, along with a dependent claim set that covered the various optional features that were described by the client, with suitable consideration of appropriate independent claim types and their features.

Generally, candidates handled the task well and the overall pass rate was similar to previous years. The most common issues that prevented candidates from achieving a pass were the inclusion of non-essential features in the independent claim, using claim language that did not cover one of the embodiments, or not providing well-structured or sufficient dependent claims to appropriately cover all the preferred features.

The invention

The invention described in the 2023 paper is a photoreactor bag apparatus for growing algae for producing biofuel or the like. Instead of pumping a mixture of algae, water and nutrients into and out of an impermeable photoreactor bag as per the prior art, the broadest inventive concept is for the photoreactor bag to include a semi-permeable membrane. This enables algae to be retained within the bag, whilst allowing the selective exchange of other substances (e.g. water or nutrients) between the bag and a body of water (e.g. the sea) on or in which the bag floats.

Two main types of this membrane were described. If the semi-permeable membrane is a forward osmosis (FO) membrane, a continuous flow of wastewater from a sewage outfall pipe can be directed into the bag. Water will pass from the bag into the sea through the FO membrane and nutrients will thus accumulate in the bag for consumption by the algae. If the semi-permeable membrane is a nutrient permeable membrane, the bag can be filled with algae and water and floated on or in a region of the sea with a high nutrient concentration. Nutrients will cross the nutrient permeable membrane into the bag, where they are consumed by the algae.

These arrangements allow the growth of algae without the energy intensive pumping of a mixture into and out of the photoreactor bag that is necessary in the prior art systems described. Depending on the embodiment, it also reduces the discharge of nutrients in wastewater or can clean up nutrients that have already been released into the sea.

Main claim

The main task this year was to draft an apparatus claim (or claims) that covered the two main embodiments that were described by the client. The majority of candidates attempted to formulate a single independent claim. It was good to see that only a small minority of candidates included two independent apparatus claims for the two different membrane types, which would likely have reduced the overall claim coverage.

There were numerous features described in the client letter as being optional, but many candidates included such features in their independent apparatus claim. As outlined in the mark scheme, the inclusion of certain features was considered catastrophic which meant no marks were awarded for such a claim. For example, defining the algae/mixture as a claimed integer (rather than reciting a bag as being merely suitable for holding such a mixture) resulted in the possibility of no marks being awarded. Some features were considered by the Examiners to be sufficiently limiting for a ten mark maximum to be applied (such as defining the semi-permeable membrane as being on the bottom of the bag) and the inclusion of other features that less seriously impacted on the scope of claim protection reduced the marks that could be awarded. Certain features, such as the inclusion of a basic inlet, that were not strictly necessary but did not seem to unduly limit the claim, were not penalised. As always, taking the time to carefully read the client's letter and determine which features are essential is the most important part of the task, and candidates should really take time to think about the impact of the language they use.

As outlined in the mark scheme, marks were also available for defining the function of the semi-permeable membrane in the independent claim. However, a significant number of candidates included a definition that excluded one of the embodiments (e.g. by requiring water to exit the bag through the semi-permeable membrane). Such a claim was also at risk of being awarded zero marks, as indicated in the mark scheme. Again, care is required to ensure all described embodiments are covered by the claim. Suitable language for defining the function of the semi-permeable membrane was provided in the question paper. It is important to note that not including the function was not in itself something which lost marks; it simply meant candidates missed out on accumulating some of the available marks.

Dependent claims

Many optional features and their associated advantages were outlined in the client's letter. Higher marks were gained by candidates who grouped and structured the dependent claims in a logical and considered manner. However, there were also many dependent claim sets in which the features were listed in no discernible order and with no consideration of the claim dependencies. A small number of candidates did not define the two main types of semi-permeable membrane (i.e. the FO membrane and the nutrient

permeable membrane) or their respective functions at all in the dependent claims, even though these provided important fallback positions.

Although the majority of candidates included a kit claim, many such claims did not achieve all the available marks because they included a closed list of contents (e.g. A kit comprising a photoreactor apparatus according to claims x and a rope and a buoy and a container of algae) rather than an open list of possible kit contents (e.g. A kit comprising a photoreactor apparatus according to claim x and at least one of a rope, a buoy and a container of algae). Many such kit claims also merely referred to “A kit of parts according to claim 1”, which often risks adding no value. Candidates are reminded to read what the client has said, rather than including an arbitrary list of independent claim types.

Although less important than in previous years, a set of method claims (which could have been dependent on the apparatus claims) were considered by the Examiners to provide useful, additional protection. However, such method claims were omitted by a surprisingly high number of candidates.

Introduction and background

This was generally handled well. Although the introduction of the client's letter sets out most of the prior art, there was a mention of certain background knowledge (e.g. that wastewater has previously been used for algae growth and that known photoreactor bags are made from polyurethane) in other parts of the letter. Candidates who pulled out prior art identified in the body of the client's letter, rather than just copying/rewording the introductory text of the letter, gained higher marks on this section.

Statements of invention

There was a large variability between candidates in the marks gained for the statements of invention section. Simply repeating the language of the dependent claims as “preferably” statements gained no marks and adding a brief mention of generic advantages against some of these statements was likely to be awarded only a few marks. The highest marks were obtained by candidates who used the statements of invention section to explain more about the claimed features and outlined the specific advantages of those features. In the vast majority of cases, at least one advantage of including the feature was available in the client letter.

It should be noted that reference to the claims by number, or by repeating the claim language, are both equally acceptable in this section. Marks were awarded for the supplementary information about the claimed feature(s) that is provided, in line with the mark scheme.

Specific description

The Examiners are looking for the function, structure, operation and alternatives to be made clear in this section. Simple repetition of text from the client's letter is unlikely to be awarded many marks. The specific description was expected to clearly describe the presence of the unified common feature conferring novelty over the art, and the two distinct embodiments. This could be supplemented with the different associated methods of use, whilst explaining any features or alternatives that were applicable to both embodiments.

It was good to note that only a small number of candidates appeared to run out of time for this section.

Abstract

The majority of papers included an abstract and on the whole the abstracts were well written. Most included a title, figure number and reference numerals.

As noted previously, the Examiners appreciate this is often the last task done at the end of the examination, but it makes sense for Candidates to just check they have got the basics covered, to ensure they add, for example, a title if they have missed it, or add in reference numerals against terms from the Figures, in order to ensure they can achieve as many marks as possible.