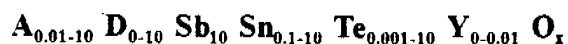


Examiners' Report on Paper A/1993 (Chemistry)

The client's letter of Paper A suggested a particular group of catalysts for oxydehydrogenation and ammoxidation of hydrocarbons, specifically for the preparation of butadiene from 1-butene and of acrylonitrile from propene.

The catalyst was a mixture of oxides of specific components, i.e. of antimony, tin, tellurium, one or more elements A selected from a group consisting of copper, vanadium, molybdenum and/or tungsten and, optionally, one or more elements D selected from a group of so-called activator elements, in specified amounts. Very low amounts of alkali (identified as Y in this report) could be tolerated in the catalyst. It was also said that the composition of the catalysts was critical and even minor modifications could impair the properties of such catalysts.

Having regard to the information given, the suggested catalyst could be defined by the following formula:



The client suggested to derive the definition of component D from document I (**D I**).

In **D I** the following elements were listed as activator elements: arsenic (As), bismuth (Bi), cobalt (Co), copper (Cu), molybdenum (Mo), nickel (Ni), selenium (Se), tin (Sn), tellurium (Te), tungsten (W) and vanadium (V).

Apart from this, **D I** did not have to be considered from the point of view of novelty or inventive step since the catalyst disclosed therein essentially required iron to be present in the catalyst, and the candidates were expected to realise this.

From the listed elements, arsenic (As) and selenium (Se) were to be avoided and according to the client's letter (page 3, paragraph 1) they had to be excluded for this reason.

Some of the other elements listed as activator elements were identical to components which in the client's catalyst were already mentioned separately. Additionally the client had indicated that the amounts of the individual components were critical. Therefore such elements, namely copper, molybdenum, tin, tellurium, tungsten and vanadium, had also to be deleted from the list of possible elements D, to avoid an overlap in the definitions of the different components. A claim wherein an element was mentioned twice, e.g., firstly, as an A element and, secondly, as a D element was considered to be inconsistent with the client's intention to put a limit on the amount of an element present.

The result of these considerations was that component D could only be Bi, Co and Ni. However the effect of document II (**D II**) on a catalyst defined in this way had to be considered.

Claims defining component D merely as activator elements did not take into account the information from the client since some of these activator elements as listed in D I were said not to be included. Moreover, such a claim obviously lacks novelty in view of D II.

D II related to a catalyst containing various components in various combinations and within broad ranges of possible amounts. Molybdenum, bismuth and antimony were mandatory in each case. Considering the extremely broad ranges and the multiplicity of possible combinations it should have been clear that the examples and comparative examples were the only part of the document which was relevant to novelty.

A simple comparison of the formulae in Table 1 of D II and in the examples (after adjusting Sb to 10 in all cases) showed that catalysts A and D anticipated the proposed formula. Adjusting the index of Sb to 10 in all cases was possible and necessary because the indices in the formulae related to atomic ratios of the components. Candidates were expected to realise this.

As will be explained hereafter none of the prior catalysts other than those named A and D in Table 1 of D II was anticipatory.

In each of the prior catalysts B, C and 1 of D II the sum of the indices  $a + b + d + e$  was  $>11$  in comparison to the amount of Sb. In catalysts E, F and 2 the amount of potassium (K) was outside the range allowed by the client. Catalyst 3 contained iron.

Such considerations should have led the candidates to come to the conclusion that a main independent claim, offering a very broad protection to the client, was a claim relating to a composition of the above formula wherein the D elements were restricted to Bi and Co; Ni being excluded. Such a claim was clearly novel over D II and, in view of the experimental results superior to those of the prior art compositions, could also be defended as involving an inventive step and attracted therefore full marks. Only a few candidates drafted a claim in this way.

A number of candidates presented an independent claim relating to the catalyst according to the client's formula, wherein besides Co and Bi component D included Ni as an activator element. In order to avoid a novelty objection based on catalysts A and D in Table 1 of D II falling within client's formula, these candidates disclaimed those two known catalysts. Such a claim could also be defended as involving an inventive step based on the experimental results provided by the client in comparison to those of D II.

Such a claim also offered a very broad protection to the client and consequently also attracted full marks.

Some candidates lost a significant number of possible marks, because they presented claims which still covered known catalysts A and D of document II.

Where the candidate chose a definition which had the effect of disclaiming one or more of his own examples, he substantially reduced the scope of the claim unnecessarily. Therefore such claims, even if novel over the prior art, were not considered satisfactory and lost at least part of the marks possible for a claim to the catalyst *per se*.

While a large number of candidates lost marks for an inadequately drafted independent claim to the catalyst they were, nevertheless, able to collect marks for dependent claims directed to preferred embodiments of the catalytic composition.

Subsidiary claims directed specifically to the individual catalysts I, II and III of the examples were also expected from the candidates in view of the excellent results provided by the client. Only a minority of candidates presented such claims.

Marks were also awarded to candidates who, as expected, had drawn up claims to a process for the preparation of the new catalytic compositions and claims to the use of these compositions in oxidative reactions of hydrocarbons, more particularly, in the dehydrogenation of 1-butene resulting in butadiene and in the ammoxidation of propene to give acrylonitrile. Many candidates produced such claims.

A further aspect of the invention was the regeneration of the catalytic composition. Since neither of the two documents referred to such a possibility, a claim could be formulated for this method. Indeed, a number of candidates suggested a method claim for regenerating the catalysts as defined in their product claims and they were given credit for such a claim.

Additional marks were awarded when a candidate referred to the possibility of preparing a divisional application to the method of regeneration and suggested a claim to the regeneration method which did not exclude the catalysts A and D known from **D II**.

A deficiency in many claims drawn up to the preparation or the regeneration of the catalysts was an inadequate definition of the essential features of these methods (cf. Art. 84 EPC and the Guidelines C-III, 4.4). According to the client's letter, certain temperatures during the calcination were a prerequisite for a satisfactory activity of the catalyst. If there was no such definition given, this resulted in a loss of possible marks for such a claim.

In both papers A and B some candidates suggested a claim to the use of air in the oxidative reactions to prevent hot spots and referred to the "second non-medical use" decisions of the Enlarged Board of Appeal G 2/88 and G 6/88. No marks were awarded for such a claim, because **D II** clearly stated that air was the preferred oxidant. Moreover, it was clearly recommended there to add inert diluents such as nitrogen or carbon dioxide to the feed.

Marks were lost by many candidates because of an inadequate wording of the first part of the description. The main shortcomings were a too succinct discussion of the prior art disclosed in **D II**, in some cases even no discussion at all, or an outline of the problem/solution aspect of the invention which was not based on the facts and results provided in the documents and in the client's letter. Some candidates did not offer any reference at all to that aspect.

A number of candidates wasted time with the title or with notes as to the provisions of Art. 167 (2) EPC.

# EXAMINATION COMMITTEE I

Candidate Paper No. ....

Report by examiner .....

FORM, for use by individual examiners, in PAPER A (Chemistry)

## Schedule of marks

Category	Maximum possible	Individual marks awarded	Where <b>grades</b> awarded are not identical	
			Revision of marks/grade (if any)	Remarks*
Claims: - Scope of protection = independent claim or claims	24			
	16			
Description: (Field and prior art, problem and/or discovery, solution and advantages)	8			
TOTAL	48			
CORRESPONDING GRADE				

### Translation of marks into grades

	Grade
0 - 11	7
12 - 17	6
18 - 23	5
24 - 29	4
30 - 35	3
36 - 41	2
42 - 48	1

\*to be filled in if both the following requirements are fulfilled:

- the grades awarded by the two individual examiners before their discussion differ by two grades or more;
  - the marks awarded by at least one of the two individual examiners have been changed during their discussion.
- If remarks are to be filled in, they should briefly explain **why** the examiner has changed his marks.