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Aktenzeichen / Case Number / N<sup>o</sup> du recours : T252/84

Anmeldenummer / Filing No / N<sup>o</sup> de la demande : 81 201 279.7

Publikations-Nr. / Publication No / N<sup>o</sup> de la publication : 0 055 497

Bezeichnung der Erfindung:

Title of invention: Removal of hydrogen sulphide and carbonyl sulphide  
Titre de l'invention : from gaseous mixtures.

### **ENTSCHEIDUNG / DECISION**

**vom / of / du 22 March 1985**

Anmelder/Patentinhaber:

Applicant/Proprietor of the patent: SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.

Demandeur/Titulaire du brevet :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Articles 52(1) and 56, and 111(1)

"Inventive step" — "Remittal of the case"

**Leitsatz / Headnote / Sommaire**

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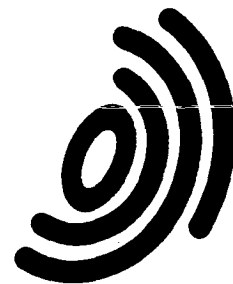
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Case Number: T 252 / 84

**DECISION**  
**of the Technical Board of Appeal 3. 4-1**  
**of 22 March 1985**

**Appellant:** SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.  
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The Netherlands

**Representative:** Mr. O. Aalbers et al.  
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**Decision under appeal:** Decision of Examining Division 031 of the European Patent  
Office dated 25 July 1984 refusing European patent  
application No 81 201 279.7 pursuant to Article 97(1)  
EPC

**Composition of the Board:**

**Chairman:** R. Kaiser  
**Member:** J. Roscoe  
**Member:** F. Benussi

- I European patent application No. 81 201 279.7 filed on 19 November 1981 and published on 7 July 1982 under publication number 0 055 497, claiming a priority of 29 December 1980 from an application (US 220 487) made in the United States of America, was refused by a decision of the Examining Division 031 of the European Patent Office dated 25 July 1984. That decision was based on Claims 1-4 filed on 14 January 1984 with Claim 1 amended at line 10 by insertion of "solid" between "a" and "catalyst" as requested in applicant's letter dated 18 April 1984.
- II The reason given for the refusal was that the subject-matter of Claim 1 did not involve an inventive step having regard to DE-A-3 015 739 (document 1), US-A-4 009 251 (document 2) and the general knowledge of the man skilled in the art, exemplified by Encyklopädie der technischen Chemie - Band 14 - 1977 - pages 426,427 (document 3).
- III On 21 September 1984 the applicant lodged an appeal against the decision and paid the appeal fee in due time. A statement setting out the grounds of appeal was filed on 8 October 1984. The statement was accompanied by a single new claim to replace all the claims on file, and by replacement pages of description.
- IV The appellant requests cancellation of the decision to refuse and the grant of a patent on the basis of the single claim filed on 8 October 1984 which reads as follows:
- A process for the removal of H<sub>2</sub>S and COS from a gaseous mixture containing H<sub>2</sub>S and COS, comprising the steps:
- (a) contacting the gaseous mixture with an aqueous solution containing a reactant and separating a gaseous mixture containing COS from an aqueous mixture which absorbed H<sub>2</sub>S;

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- (b) contacting the gaseous mixture containing COS separated in step (a) in the presence of water with a catalyst causing hydrolysis of COS and separating a gaseous mixture containing  $\text{CO}_2$  and  $\text{H}_2\text{S}$  from the catalyst;
- (c) regenerating the aqueous mixture separated in step (a) by stripping, yielding a regenerated solution;
- (d) contacting the gaseous mixture containing  $\text{CO}_2$  and  $\text{H}_2\text{S}$  separated in step (b) with at least a portion of the regenerated solution obtained in step (c), forming a partially reacted aqueous mixture, and separating a purified gas from the aqueous mixture, the separated aqueous mixture being employed as aqueous solution in step (a), optionally in the presence of regenerated solution from step (c) and not used in step (d), characterised in that the reactant in the aqueous solution of step (a) comprises an ion and/or a chelate of an oxidizing polyvalent metal, which produces in step (a) a reduced reactant and sulphur, the reduced reactant being regenerated in step (c) by stripping with oxygen, in that the catalyst causing hydrolysis of COS in step (b) is a solid catalyst comprising Ni, Pd, Pt, Co, Rh or In, in that regenerated reactant obtained in step (c) produces sulphur in step (d), and in that sulphur is removed from the aqueous mixture to be used in step (a), step (d) and/or from the aqueous mixture which has been used in step (a).

Reasons for the decision

1. The appeal complies with Articles 106-108 and Rule 64 EPC and is therefore admissible.
2. There is no objection to the present claim on formal grounds since it is adequately supported by the specification as originally filed. The claim results essentially from a combination of the features of original Claims 1-4 and 7

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and part of Claim 6 with the passage at page 10, lines 1-9 of the original description relating to preferred catalysts for the hydrolysis of COS, and that at page 14, lines 20-23 relating to removal of sulphur from the aqueous mixture to be used in step (d).

The features have been rearranged and split up to group those already known in combination from document 1, the closest prior art document, in the preamble to produce a two-part claim meeting the requirements of Rule 29(1).

Apart from verbal changes necessitated by rearrangement to the two-part form which do not affect its substance the present claim differs from the Claim 1 on which the rejection was based only in the additional feature that the solid catalyst comprises Ni, Pd, Pt, Co, Rh or In.

3. A process according to the preamble of the claim is known from document 1. Referring to Figure 1 steps (a) and (b) are performed in absorption tower 12 and reactor 16 respectively and step (c) in stripping equipment disposed between outlet 28 and inlet 22. The gaseous mixture from step (b) is contacted by the regenerated solution in absorption tower 20 to yield purified gas at 30 and partially reacted aqueous mixture for use in step (a) at 24 (step (d)). The reactants proposed for use in step (a) are various alkanolamines and H<sub>2</sub>S selective absorbents such as Selexol, and the hydrolysis of COS, step (b), is catalysed by an aqueous alkanolamine solution. There is no mention of solutions comprising ions or chelates of polyvalent metals, nor of solid catalysts, nor indeed of any catalyst containing any of the metals now listed in the claim.

Document 2 describes a single stage process for the removal of hydrogen sulphide and alkyl mercaptans from gaseous streams

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by contacting them with an aqueous polyvalent metal chelate solution (cf. step (a) in part and the associated reference to reactant used therein and its effect in the characterising part of the claim). In the resulting reaction the hydrogen sulphide is oxidised to elemental sulphur and the metal in the chelate reduced, the chelate being subsequently regenerated for re-use by stripping with oxygen (cf. step (c) and its elaboration in the characterising part). The document does not describe any procedure for the hydrolysis of COS.

In the cited pages of document 3 the hydrolysis of COS in the presence of a solid catalyst is disclosed. The catalysts mentioned do not, however, include any of the metals referred to in the claim and there is no suggestion to combine the hydrolysis with a preliminary step to remove H<sub>2</sub>S using an aqueous solution of a polyvalent metal ion or chelate.

None of the other documents cited in the search report is more relevant than the above.

Thus the subject-matter of the claim is novel.

4. The Examining Division has had no opportunity to examine whether an inventive step is involved in the process claimed in the only claim now effective since this includes a feature - that the solid catalyst comprises Ni, Pd, Pt, Co, Rh or In - which was not present in any of the original claims. Therefore so as not to deprive the applicant of his right to an examination in two instances the Board considers it appropriate to remit the application to the Examining Division for further prosecution under the provisions of Article 111(1) EPC.

.../...

Order

For these reasons it is decided that:

- (1) the decision of the Examining Division of the European Patent Office dated 25 July 1984 is set aside.
- (2) The case is remitted to the Examining Division for further prosecution on the basis of the following documents:

the claim filed on 8 October 1984;  
description pages 1-3 and 8 filed on 8 October 1984,  
and pages 4-7 and 9-12 filed on 14 January 1984;  
the figure filed on 14 January 1984.

The Registrar

The Chairman

B A Norman

R Kaiser