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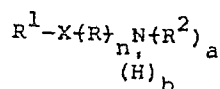
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# EUROPEAN PATENT APPLICATION

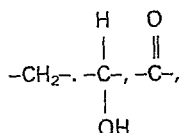
(21) Application number: **85306521.7**(51) Int. Cl.<sup>3</sup>: **B 03 D 1/02**(22) Date of filing: **13.09.85**(30) Priority: **13.09.84 US 649890**(43) Date of publication of application:  
**19.03.86 Bulletin 86/12**(88) Date of deferred publication of search report: **06.09.89**(64) Designated Contracting States:  
**BE DE FR GB IT LU NL SE**(71) Applicant: **THE DOW CHEMICAL COMPANY**  
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(54) Novel collectors for the froth flotation of mineral values.

(57) A collector and process for recovering metal values from a metal ore by subjecting the metal ore, in the form of an aqueous pulp, to a froth flotation process in the presence of a collector wherein the collector comprises a compound corresponding to the formula

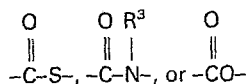


where R is



or mixtures thereof and n is an integer from 1 to 6 or  $\{R\}_n$  is  $\{CH_2\}_mC\equiv$  where m is an integer from 0 to 6; R<sup>1</sup> and each R<sup>2</sup> are independently C<sub>1-22</sub> hydrocarbyl or a C<sub>1-22</sub> hydrocarbyl substituted with one or more hydroxy, amino, phosphonyl, alkoxy, imino, carbamyl, carbonyl, thiocarbonyl, cyano, carboxyl, hydrocarbylimino groups, with the proviso that R<sup>2</sup> can be a divalent radical with both valencies bonded directly to the N atom

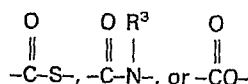
X is  $-\text{S}-$ ,  $-\text{O}-$ ,  $-\text{N}-\text{R}^3$ ,

R<sup>3</sup> is H or a C<sub>1-22</sub> hydrocarbyl;

a is an integer of 0, 1 or 2;

b is an integer of 0, 1 or 2;

with the proviso that the sum of a and b equals 2 except when R<sup>2</sup> is a divalent radical with both valencies bonded directly to the N atom, in which case, b=1 and a=0 or when  $\{R\}_n$  is  $\{CH_2\}_mC\equiv$  in which case, a+b=0, and with the further proviso that when X is

the carbonyl moiety is bonded to R<sup>1</sup>.

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**PARTIAL EUROPEAN SEARCH REPORT**  
which under Rule 45 of the European Patent Convention  
shall be considered, for the purposes of subsequent  
proceedings, as the European search report

Application number

EP 85 30 6521

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	FR-A-1 136 073 (SOC. MINIERE DE PENARROYA) * Page 1, right-hand column; page 2, left-hand column, example 1, right-hand column, example 2 * --	1-5, 8, 10	B 03 D 1/02
X	US-A-3 985 645 (H.L. NOBLITT) * Column 2, lines 31-58 * --	1-3, 8, 10	
X	EP-A-0 070 534 (HOECHST) * Page 24, lines 1-36 * --	1, 2, 8, 9	
A	US-A-4 422 928 (Q.T. MCGLOTHLIN) * Column 14, lines 9-19 * --	1, 2	TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
X	SOVIET INVENTIONS ILLUSTRATED, Week 17, June 6, 1984, ref.no. 105923;		B 03 D
<b>INCOMPLETE SEARCH</b> ./. The Search Division considers that the present European patent application does not comply with the provisions of the European Patent Convention to such an extent that it is not possible to carry out a meaningful search into the state of the art on the basis of some of the claims. Claims searched completely: Claims searched incompletely: Claims not searched: Reason for the limitation of the search: Excessive number of combinations of the values given to the different substituents in the general formula of claim 1, many of these leading to chemical compounds of improbable structure, and only some possibilities are supported by the description			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>01-06-1989</b>	Examiner <b>LAVAL</b>
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



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## CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid.  
namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

## X LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions.

namely:

See page - B -

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☒ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid.  
namely claims: 2-7,9 and 1,8,10 partially (see points 1,2,4)
- ☐ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims.  
namely claims:



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# PARTIAL EUROPEAN SEARCH REPORT

Application number

EP 85 30 6521

- 2 -

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	Derwent Public. Ltd, London, GB & SU-A-1 030 025 (MEDIKHANOV D.G.) 23-07-1983 * Abstract *	1,8,10	
	--		
X	SOVIET INVENTIONS ILLUSTRATED, Week 36, October 17, 1984, ref.no. 224464 Derwent Public. Ltd, London, GB & SU-A-1 066 655 (MEDIKHANOV D.G.) 15-01-1984 * Abstract *	1,8,10	
	--		
X	US-A-2 365 084 (D.W. JAYNE, Jr.) * Page 1, left-hand column, line 32 - right-hand column, line 35 *	1,8,10	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
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X	GB-A- 554 814 (AMERICAN CYANAMID) * Page 1, lines 48-66; page 2, lines 56-71 *	1,8,10	
	--		
X	US-A-3 772 345 (G.E. HAM et al.) * Column 1, lines 11-50 *	1,8,10	
	--		
X	GB-A- 547 292 (AMERICAN CYANAMID) * Page 2, lines 15-50,96-111 *	1-3,7- 10	
	--		
X	GB-A- 578 695 (AMERICAN CYANAMID) * Page 1, lines 36-80 *	1-3,7- 10	
	--		
X	US-A-2 364 272 (L.J. CHRISTMANN) * Page 1, right-hand column, line 24 - page 2, right-hand column, line 14 *	1,7-10	
	--		
X	FR-A-2 171 281 (DOW CHEMICAL CO.) * Page 14, lines 1-13 *	1,8,10	
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**XX LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

## 1. Claims 4-6 and 1-3,7-10 partially:

A collector of the indicated general formula, wherein:

$R = -CH_2-$  and  $X = -S-, -O-,$  or  $-N-R^3$ ; and the process for recovering metal values using such a collector

## 2. Claims 1,7-10 partially:

A collector and its use, wherein:

$R = \begin{array}{c} H \\ | \\ -C- \\ | \\ OH \end{array},$  or  $\begin{array}{c} O \\ || \\ -C- \end{array},$  and  $X = -S-, -O-,$  or  $-N-R^3$

## 3. Claims 1,8,10 partially:

A collector and its use, wherein:

$\text{---}(R)\text{---}_n = \text{---}(CH_2)\text{---}_m C\equiv,$  and  $X = -S-, -O-,$  or  $-N-R^3$

## 4. Claims 1-3,7-10 partially:

A collector and its use, wherein:

$R = -CH_2-$ , and  $X = \begin{array}{c} O \\ || \\ -C-S- \end{array}, \begin{array}{c} O \\ || \\ -C-N- \end{array} R^3, \text{ or } \begin{array}{c} O \\ || \\ -CO- \end{array}$

## 5. Claims 1,8,10 partially:

A collector and its use, wherein:

$R = \begin{array}{c} H \\ | \\ -C- \\ | \\ OH \end{array},$  or  $\begin{array}{c} O \\ || \\ -C- \end{array},$  and

$X = \begin{array}{c} O \\ || \\ -C-S- \end{array}, \begin{array}{c} O \\ || \\ -C-N- \end{array} R^3, \text{ or } \begin{array}{c} O \\ || \\ -CO- \end{array}$

## 6. Claims 1,8,10 partially:

A collector and its use, wherein:

$\text{---}(R)\text{---}_n = \text{---}(CH_2)\text{---}_m C\equiv,$  and

$X = \begin{array}{c} O \\ || \\ -C-S- \end{array}, \begin{array}{c} O \\ || \\ -C-N- \end{array} R^3, \text{ or } \begin{array}{c} O \\ || \\ -CO- \end{array}$