



Extraction of Rare Earth Elements with CO₂ and Other Greenhouse Gases

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Patent Status:

Patent Pending

Description of Technology

Rare earth elements (REEs) are a series of 17 elements that are being increasingly used in renewable energy and energy-efficient technologies because of their unique electronic, magnetic, optical, and catalytic properties. These elements usually coexist in minerals due to their chemical similarity.

The traditional way to obtain these REEs is to mine them. University of Wyoming researchers are trying to find different ways of extracting the REEs once they have been mined. They have created an invention that can use carbon dioxide (CO₂) extraction to extract the REEs. Compared to traditional solvent extraction methods, using CO₂-pressure can greatly minimize the generation of secondary radioactive wastes by omitting the acid dissolution process.

University of Wyoming researchers have performed initial tests of this method and have data relating to at least one embodiment of the invention that uses formic acid together with CO₂ to extract REEs from coal and ash. They have initially shown that using formic acid and CO₂-pressure can effectively extract REEs from coal and ash.

Applications

This invention can be used as an alternative method to extract REEs from coal and coal combustion byproducts. It is a safer method than what is traditionally being used because it greatly reduces the generation of secondary radioactive wastes by omitting the acid dissolution process.

Features & Benefits

- Effective way to extract REEs
- Safer than traditional solvent methods

Rare Earth Elements

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Unq	Uup	Uuh	Uus	Uuo	Uue	Uun								
		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu		
		Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr		

<http://www.pgm-blog.com/wp-content/uploads/2013/07/Rare-Earth-Elements.jpg>

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