

CO₂ and SO₂ sequestration using industrial waste at room temperature

A Spanish public research organisation and two universities from Spain have developed a process that allows mineral sequestration of CO₂ and SO₂, gases that trigger the greenhouse effect and acid rain respectively. The process is based on the reuse of calcium-rich industrial waste produced by many types of industries, performed at room temperature and outdoors, so it's an easier and cheaper process than the existing ones.

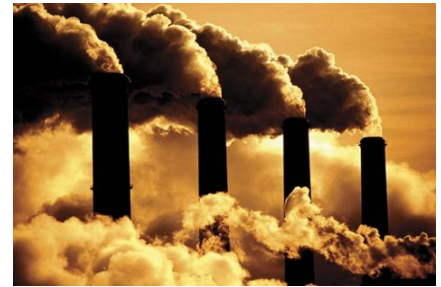
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Waste recycling for decontamination

The present invention consists in a method for capturing CO₂ and SO₂. The process combines two subprocesses:

1. The CO₂ sequestration by smart management of wet wastes with high calcium content, controlling the wastes physical properties and the reaction kinetics in order to obtain high efficiencies. The process is based on the total carbonation of calcium-rich waste, performed at room pressure and temperature. The product of the reaction is calcite, an innocuous material that can be dispersed or sold, an outcome that means an added value of the process.
2. Use of the mineral CO₂ sequestration outcome, calcite, to fix SO₂.

The overall process is based on the use and upgrading of industrial wastes as generated, without further treatment, at room temperature and pressure, resulting in reduced emissions of both CO₂ and SO₂. This complete cycle will produce other species that may be used to generate the initial reactant, closing the cycle, or may be revalued and sold. The process allows different variants, depending on the desired end product, that can be chosen among different reusable materials such as calcite, gypsum, or sodium sulfate.



New method for CO₂ and SO₂ capture using industrial waste, presenting a double environmental benefit, the air pollution control and recycling of industrial waste, transforming them into harmless and value added materials.

Main innovations and advantages

- The process allows the capture of the pollutants CO₂ and SO₂, directly as they are emitted and CO₂ in the atmosphere.
- The process uses as reactive materials industrial wastes without prior treatment or removal from mines and quarries, simply as they are discarded.
- The products obtained are usable materials, such as Na₂SO₄, which can be used for the manufacture of detergents, calcite (CaCO₃) or gypsum (CaSO₄). It's possible to design the process depending on the desired product.
- The process does not use high pressure or high temperature, since it's performed at room temperature, making it easier, cheaper and more energy efficient.
- The process uses no cycles of calcination and carbonation, definitively fixing gaseous pollutants.
- Since the process uses waste materials as they are discarded it does not require the mining, further processing or transport them. The procedure is a closed loop developed within the same industrial park and thus avoids the corresponding energy consumption and pollution associated with these processes.
- The CO₂ and SO₂ capture occurs in different phases, allowing the separate gases extraction, being an advantage for later sale.

Patent Status

Spanish patent application filed.

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