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the invention allows sulfur trioxide (and from that sulfuric acid) to be produced in a scsa system with a conversion efficiency and emissions similar to that obtained from a dcda system. the extra absorption tower, any associated heat exchanger, piping, and controls that typically appear in a dcda are no longer needed to obtain similar desirable results. platinum catalyst was historically used up to the early 1900s in systems for producing

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sulfuric acid by the contact process but had certain technical, availability, and economic disadvantages. the platinum catalyst could be poisoned and suffer a loss in activity by the presence of arsenic impurities from roasting sulphide minerals, over a century ago, the mannheim process was developed to overcome these problems, in this process, a first conversion stage uses ferric oxide catalyst followed by a so3 absorption, and then a second conversion stage uses platinum catalyst and a final so3 absorption. on the economic side however, platinum was and still is relatively rare and expensive, sulfuric acid is the basis for all organic, nonvolatile acids used in large quantities in industry, such as the acid used in etching silicon-based semiconductors, the acid in photography, and the acid used in the manufacture of

aluminium. it is also used in the production of cleaning products such as toilet bowl cleaner, and in the production of speciality chemicals such as sodium hydrosulphite for the production of sulphite pulp in the paper and textile industries, and sodium hydrosulphide for the production of sulfuric acid anhydride.

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the process allows sulfur dioxide and oxygen to be reacted at temperatures below those of conventional claus plants, which operate at temperatures about 5–0c– (27–c) to 50–0c– (122–c), and at relatively high pressures, e.g., 500 to 1000 psig. the invention allows a hydrogen sulfide-free plant gas stream consisting essentially of up to 50 mole percent

so 2 to be contacted with oxygen at temperatures from about 225 to 300°c (419 to 552°f), and at a pressure of from about 75 to 200 psig (531 to 1,058 kpa) in the presence of a catalyst comprising vanadium and cesium at a space velocity of from about 1.0 to 10.0 space velocities (expressed as the total flow of the gas stream through the reactor). the catalyst comprising vanadium and cesium is active at sulfur dioxide conversion and absorption temperatures below those of conventional claus plants and operates at the same pressures as the claus reactor. an advantage of this process over conventional claus technology is that the so3 absorption reaction is exothermic, therefore requiring no external heat input to remove the heat of reaction. secondly, so2 absorption occurs at much lower temperatures than so3 absorption

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from conventional claus, i.e., in the range about 150 to 175°c (-10 to 18°c). for instance, u.s. pat. no. 7,776,611 discloses a process for the manufacture of sulfuric acid in which a gas stream comprising sulfur dioxide and oxygen is passed through a plurality of preliminary contacting stages, in each of which the gas is contacted with a monolithic catalyst comprising a platinum active phase, thereby converting a substantial fraction of the sulfur dioxide in the gas stream to sulfur trioxide. the gas stream leaving one of the plurality of preliminary contacting stages is contacted with sulfuric acid in an absorption zone to remove sulfur trioxide from the stream by absorption in the sulfuric acid. after having passed through the plurality of preliminary stages and the absorption zone, the gas stream is passed through a final

## contacting stage in which it is contacted with a particulate catalyst comprising vanadium and cesium, thereby substantially converting residual sulfur dioxide in the gas to sulfur trioxide. 5ec8ef588b

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