Innovative Use of Nanoparticles Against Industrial CO2 Emissions

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Carbon Capture, Utilization and Storage is not economically feasible. CO2 absorbed by monoethanolamine (MEA) to be utilized/stored must be desorbed while solvent is simultaneously regenerated. The amount of energy required to attain temperatures necessary for this solvent regeneration is too high. To combat this issue, graphene-iron nanocomposites were synthesized and their characteristic 'localized heat effect' was used. CO2 desorption from spent solvent was observed at a set of temperatures before and after the addition of different masses of graphene-iron nanocomposites (5g, 10g, 20g, 40g, 80g, 100g). The nanocomposites reduced the regeneration temperature from 150-180°C to 55°C and desorption efficiency of 100% was achieved. The ideal quantity of nanoparticles observed in the experiment was 20 mg/200 mL of 30% MEA solution. Furthermore, 55°C temperature was achieved in this spent MEA by using solar energy, eliminating the use of fossil fuels in the process. With suitable adjustments, incorporation by small scale industries will become a possibility. The highly reduced energy requirement due to the drastically lower temperature needed for desorption of CO2 makes CCUS feasible for a vastly increased number of industries.