



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

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Project Title Detoxifying the Atmosphere	
Abstract Objectives/Goals Human-induced climate change is a severe detrimental stress, particularly on ecological and socio-economic systems that are already affected by pollution. Carbon dioxide (CO ₂), a greenhouse gas is the key pollutant responsible for global warming. This project hypothesizes that if the fumes from motor vehicle exhausts are passed through aqueous ammonia (aq NH ₃), then the amount of emitted carbon dioxide pollutant will decrease. Methods/Materials First create a muffler device that will allow car exhaust fumes to flow through aqueous ammonia. Next use a carbon dioxide sensor to test its concentration in the fumes flowing through air, water, and ammonia. Conduct a lime water test to see if a carbonate or bicarbonate exists in the solution. Conduct a phenolphthalein test to see if ammonium bicarbonate exists in the solution. Results Hypothesis is accepted for this experiment. The amount of carbon dioxide emitted as a pollutant from the car exhaust did decrease when the fumes were passed through aqueous ammonia. The products formed upon the reaction of CO ₂ and aq NH ₃ contains ammonium bicarbonate (NH ₄) ₂ CO ₃ . A positive result from the lime water test confirms the presence of either a bicarbonate or carbonate. Lighter pink color with phenolphthalein indicator confirms the presence of a bicarbonate. Ammonium bicarbonate is a very effective and commonly used nitrogen fertilizer. Conclusions/Discussion Thus, this investigation outlines a simple, yet effective method of reducing the CO ₂ emission into the atmosphere with the simultaneous production of a useful by-product. The product formed from this reaction, ammonium bicarbonate, has already been proven and is currently being used as an effective nitrogen fertilizer internationally.	
Summary Statement This project tests to see if aqueous ammonia can filter out carbon dioxide in car exhausts fumes, which creates ammonium bicarbonate used in nitrogen fertilizer.	
Help Received Used high school chemistry lab to perform chemical tests.	