

Outline specification for work to be undertaken: ammonium carbamate

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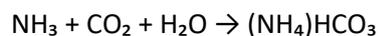
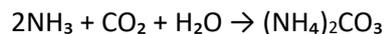
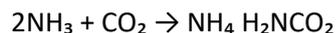
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INTRODUCTION

Progressive Energy is developing a number of projects which require carbon (dioxide) capture and storage (CCS), and as a part of these, it is necessary to prescribe a specification for the carbon dioxide which is to be stored, recognising that it will not be a pure fluid. Such a specification is necessary, not just to envelope the thermodynamic properties of the carbon dioxide stream, but also its chemical properties.

Work to ascertain the thermodynamic and chemical properties of impure carbon dioxide is incomplete, although there have been significant advances in the last decade. Nevertheless, some of it is theoretical and has yet to be validated with experimental data.

This specification is to define the work necessary to obtain essential information on one of the potential reaction sets, between ammonia and carbon dioxide. The potential reaction salts are ammonium carbamate, ammonium carbonate and ammonium bicarbonate, the latter also requiring the presence of water:



SCOPE

Two sets of experiments are required, as follows:

1. Ammonium carbamate reaction set

- Conditions are at 5bara and 30bara, 25°C
- Ammonia concentration initially at 1500ppmv and at 10ppmv

First question to be answered: is ammonium carbamate formed at 1500ppmv, and if so what is the time/reaction completion graph. Limit 400 hours.

Second question to be answered: is ammonium carbamate formed at 10ppmv, and if so what is the time/reaction completion graph. Limit 1400 hours.

2. Ammonium carbonate / bicarbonate reaction set

- Conditions are at 5bara and 30bara, 25°C
- Ammonia concentration initially at 1500ppmv and at 10ppmv

First question to be answered: is ammonium carbonate and/or bicarbonate formed at 1500ppmv, and 50ppmv of water, and if so what is the time/reaction completion graph. Limit 400 hours.

Second question to be answered: is ammonium carbonate and/or bicarbonate formed at 1500ppmv, and 75ppmv of water, and if so what is the time/reaction completion graph. Limit 400 hours.

Third question to be answered: is ammonium carbamate formed at 10ppmv, and 50ppmv of water, and if so what is the time/reaction completion graph. Limit 1400 hours.

TIMESCALE

The tenderer is required to state on what timescale results from the above work could be provided, taking into consideration existing commitments of staff and facilities (rigs etc).

In assessing the bids from tenderers, a high value will be assigned to those who are able to deliver the required results quickly.

DELIVERABLES

The deliverables are a written report (in MS Word Format) describing the rig used, the work carried out and the results in sufficient detail to permit Peer Review and subsequent publication at an International Conference.

OWNERSHIP OF DEVELOPED INTELLECTUAL PROPERTY

The intention is to publish the results such that they are available internationally to advise CCS schemes worldwide. No intellectual property rights will be assigned to the successful tenderer or to Progressive Energy.

POTENTIAL ADDITIONAL WORK

A Provisional Sum shall be included with the bid for up to 5 (five) more experiments to be carried out at slightly different concentrations of ammonia and/or water to allow any intermediate situations to be investigated. An extension of timescale may be agreed to facilitate this work.

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