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RESORPTION UPDATES

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UKRI Engineering and Physical Sciences Research Council

STET Sustainable Thermal Energy Technologies

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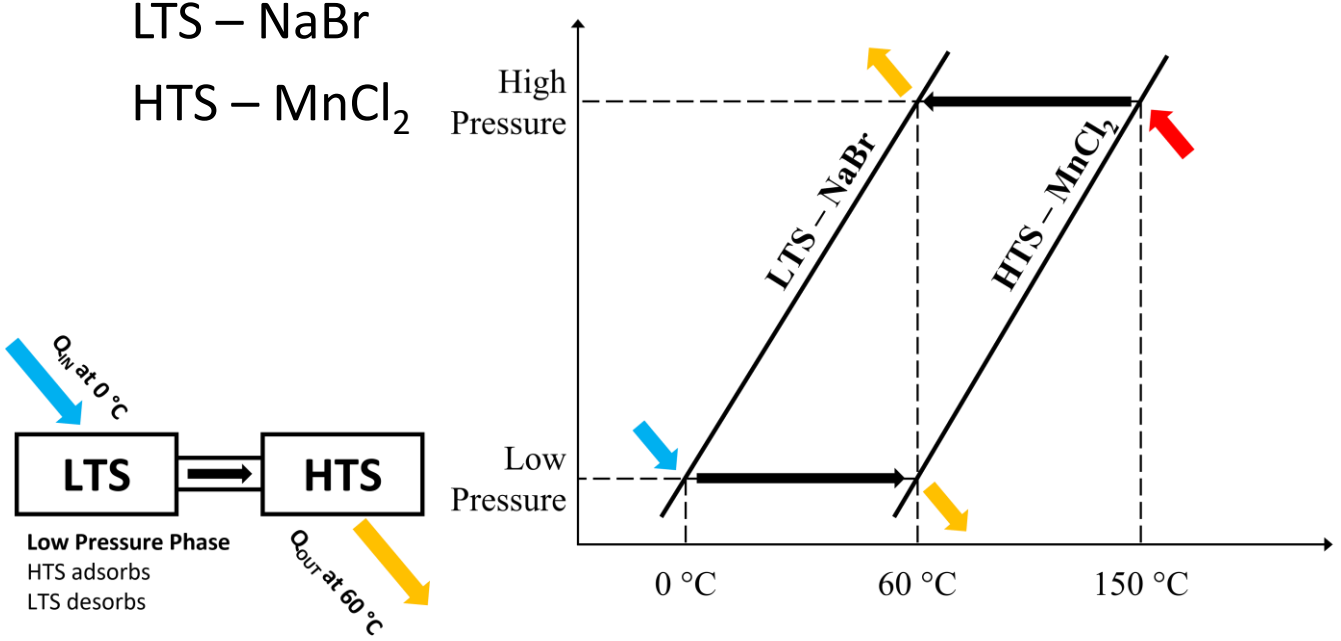
1. Resorption HP Operation

- Two salt **domestic heat pump** using ammonia-salt

LTS – NaBr

HTS – $MnCl_2$

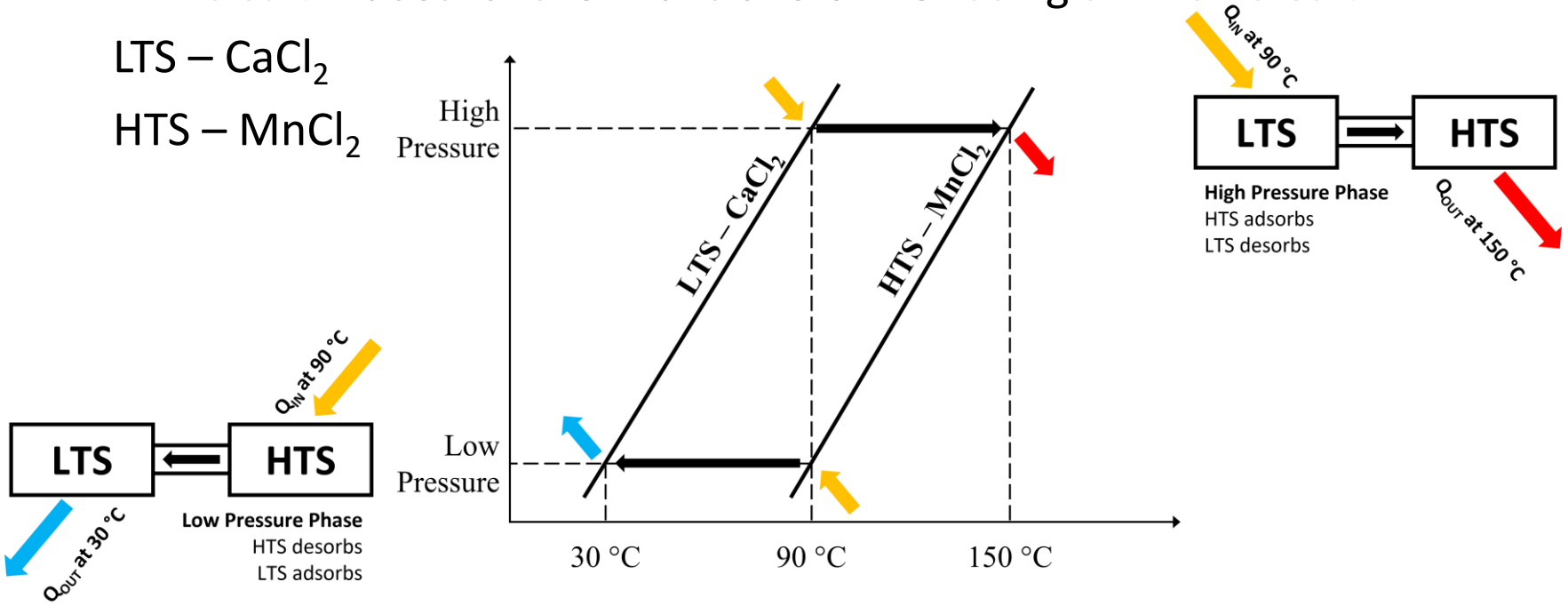


2. Resorption TT Operation

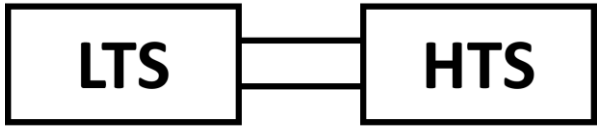
- Two salt **industrial thermal transformer** using ammonia-salt

LTS – $CaCl_2$

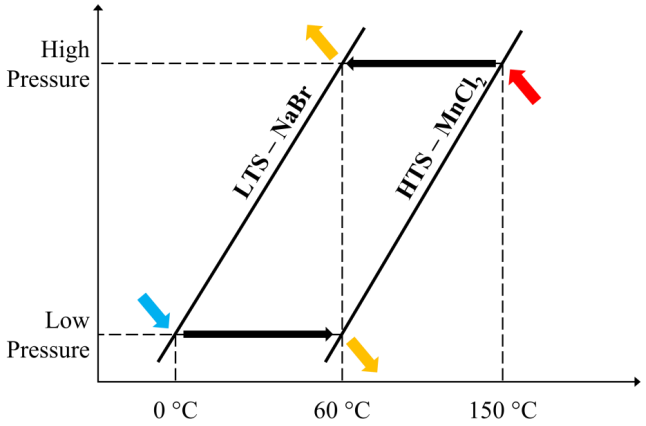
HTS – $MnCl_2$

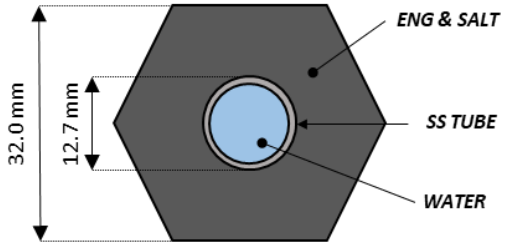


3. Resorption Design

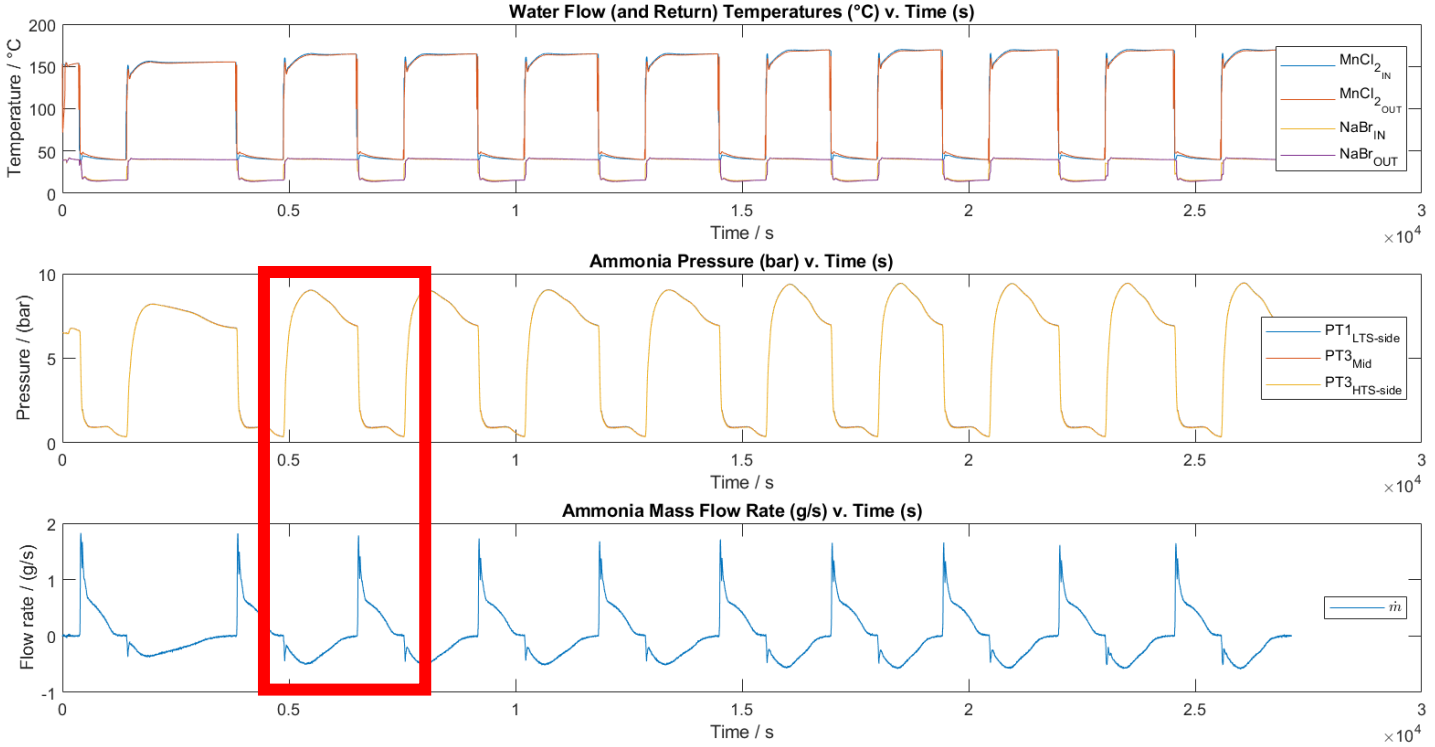


- Two reactors with salt, and an ammonia connection between them (+ some fluid flow to each reactor)

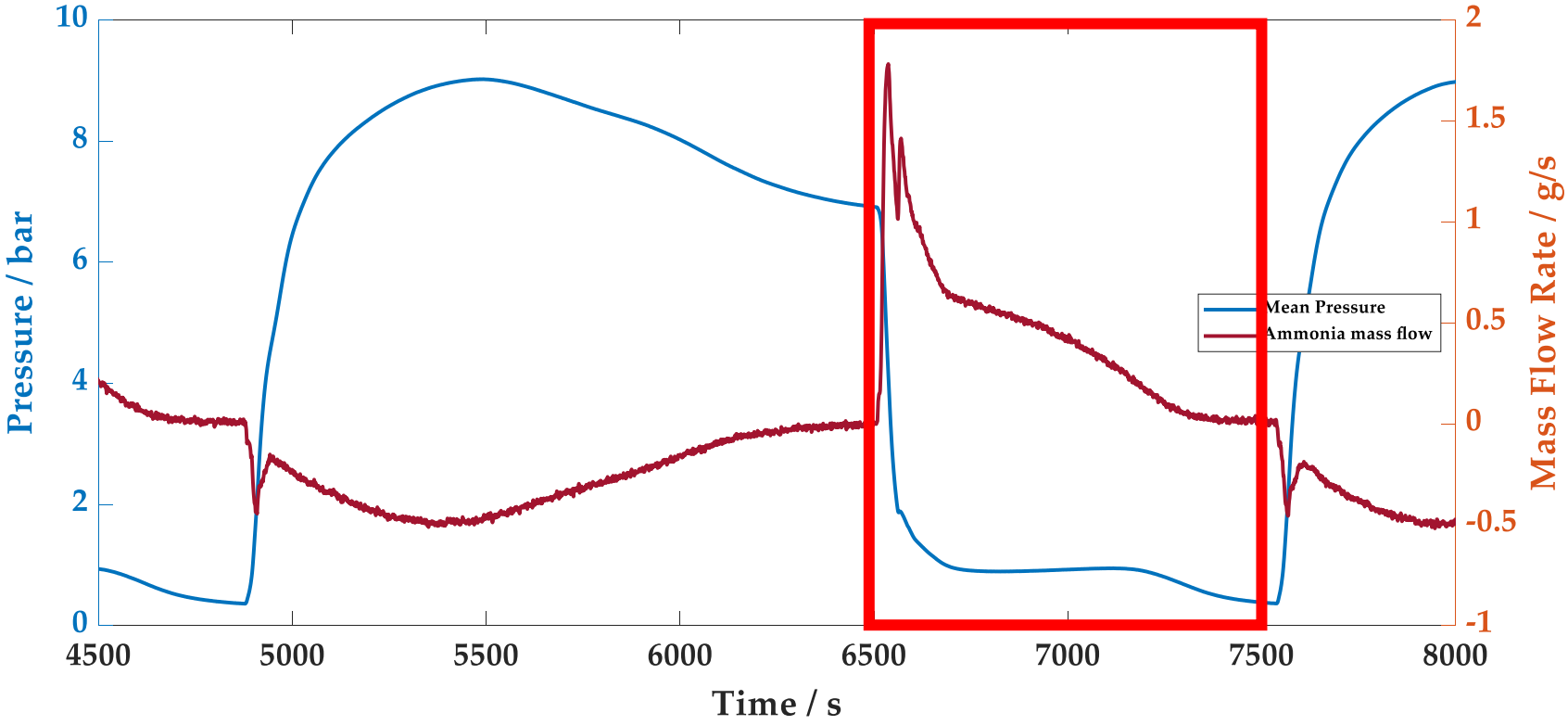




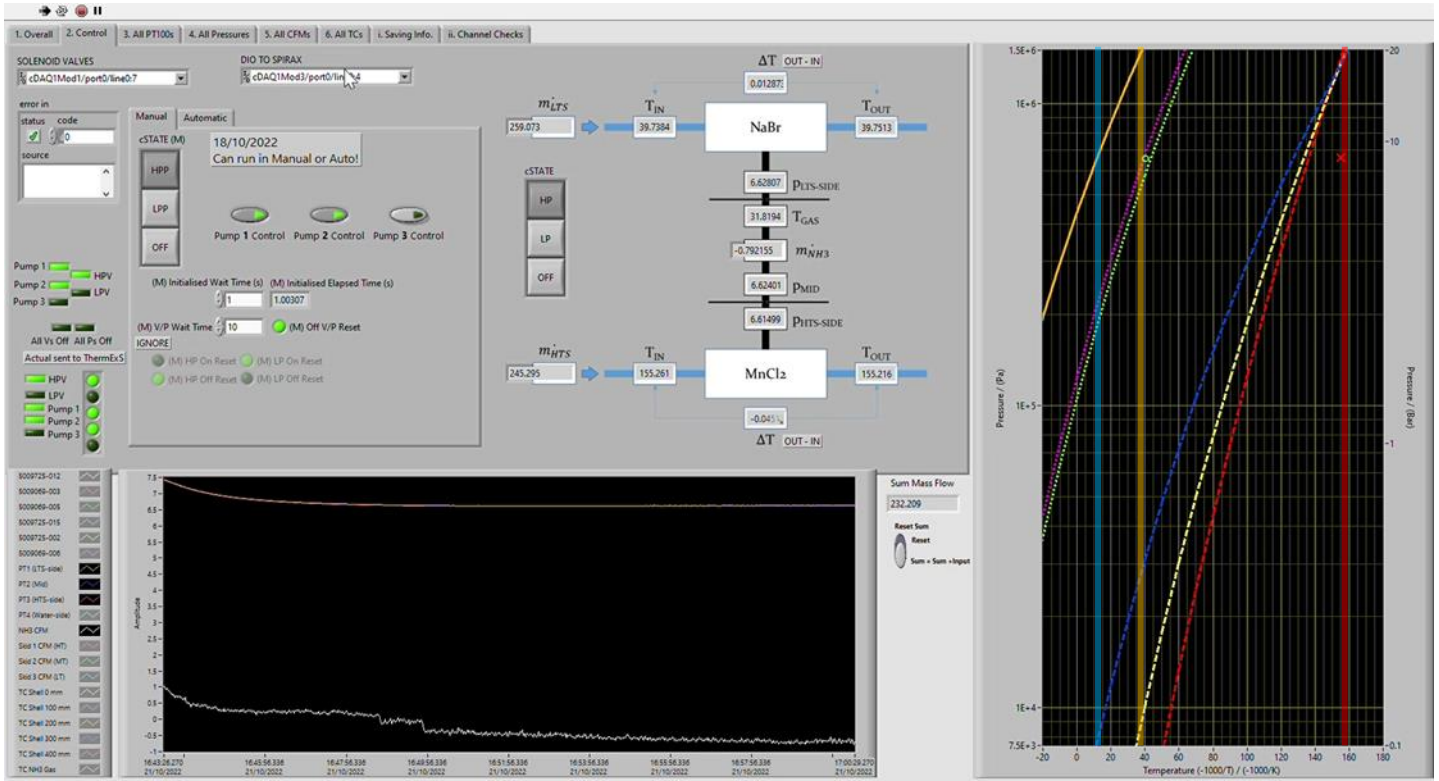
4. Results: Resorption Tests (HP)



5. Results: Resorption Tests (HP)



6. Results: In Operation



7. Results: Resorption Tests

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- COP ≈ 1.25 at around 1 kW power output.
- Lower than anticipated, but 100+ cycles now conducted with repeatable results.
- Heat exchanger failure and valve leakage has brought testing to an end.

10. Plan: Resorption HP Testing

- Finish writing the thesis summarising the findings to date.
- Continue resorption heat pump testing
  - Testing matrix for different temperatures
  - Clipping to shorten cycle times
- Investigate improvements in the tube-side composite contact to enhance the heat transfer
- Glycol updates

T_L	15 / 10 / 5 °C			
$(T_H \setminus T_M)$ / °C	60	50	40	30
170		7	6	
160		2	1	3
150			4	5

11. Conclusions

- A two-salt resorption test bench has been designed and manufactured.
- The system can be cycled in a repeatable manner and is providing useful insight into the nature of coupled ammonia-salt reactions.
- Initial results are promising having completed over 100 cycles with heat pump operation.
- Ongoing repairs to the heat exchanger and valve manifold before testing can start again.

THANK YOU FOR LISTENING

QUESTIONS?

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