

Novel technologies for integrated biogas separation and compression

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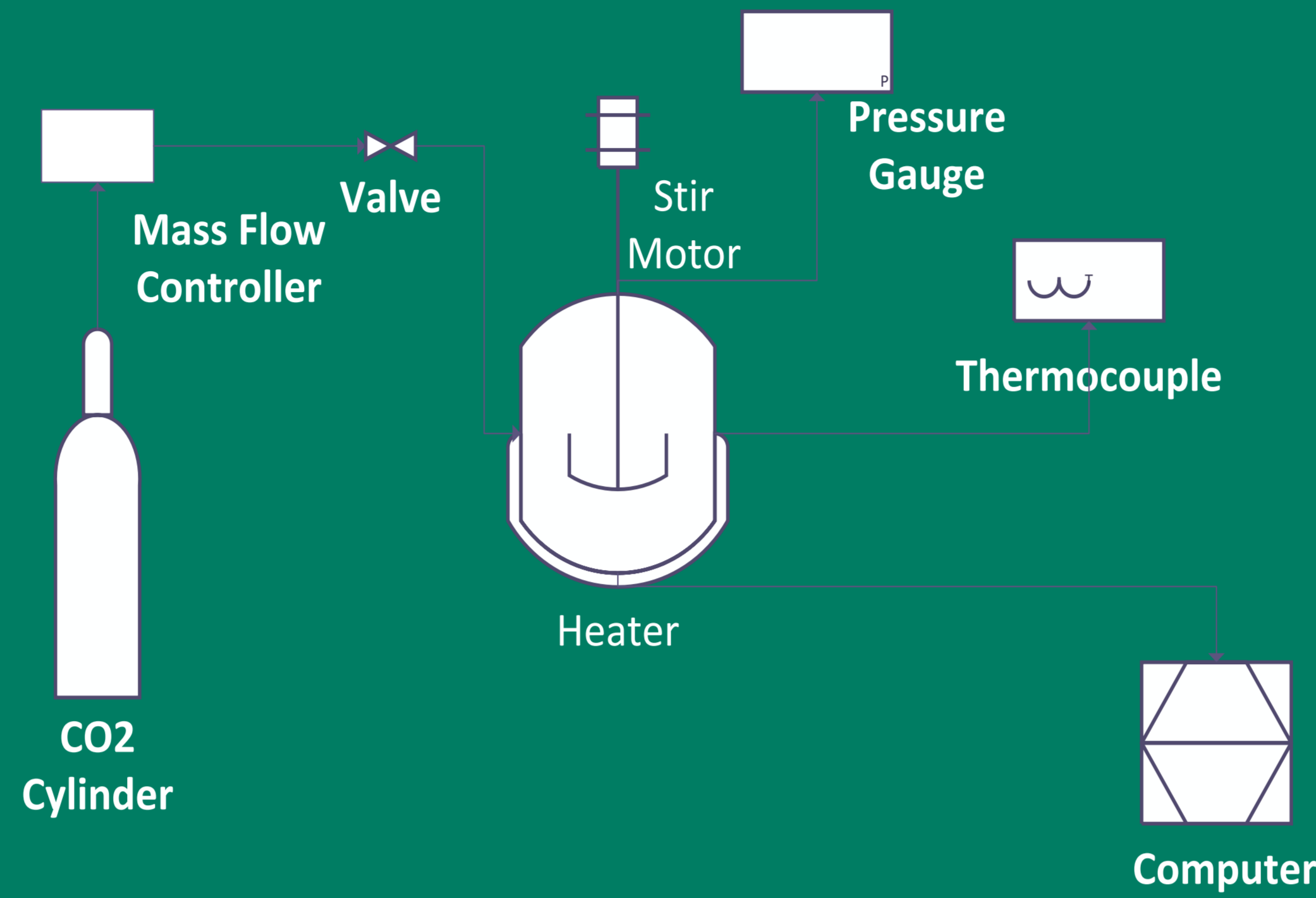
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INTRODUCTION

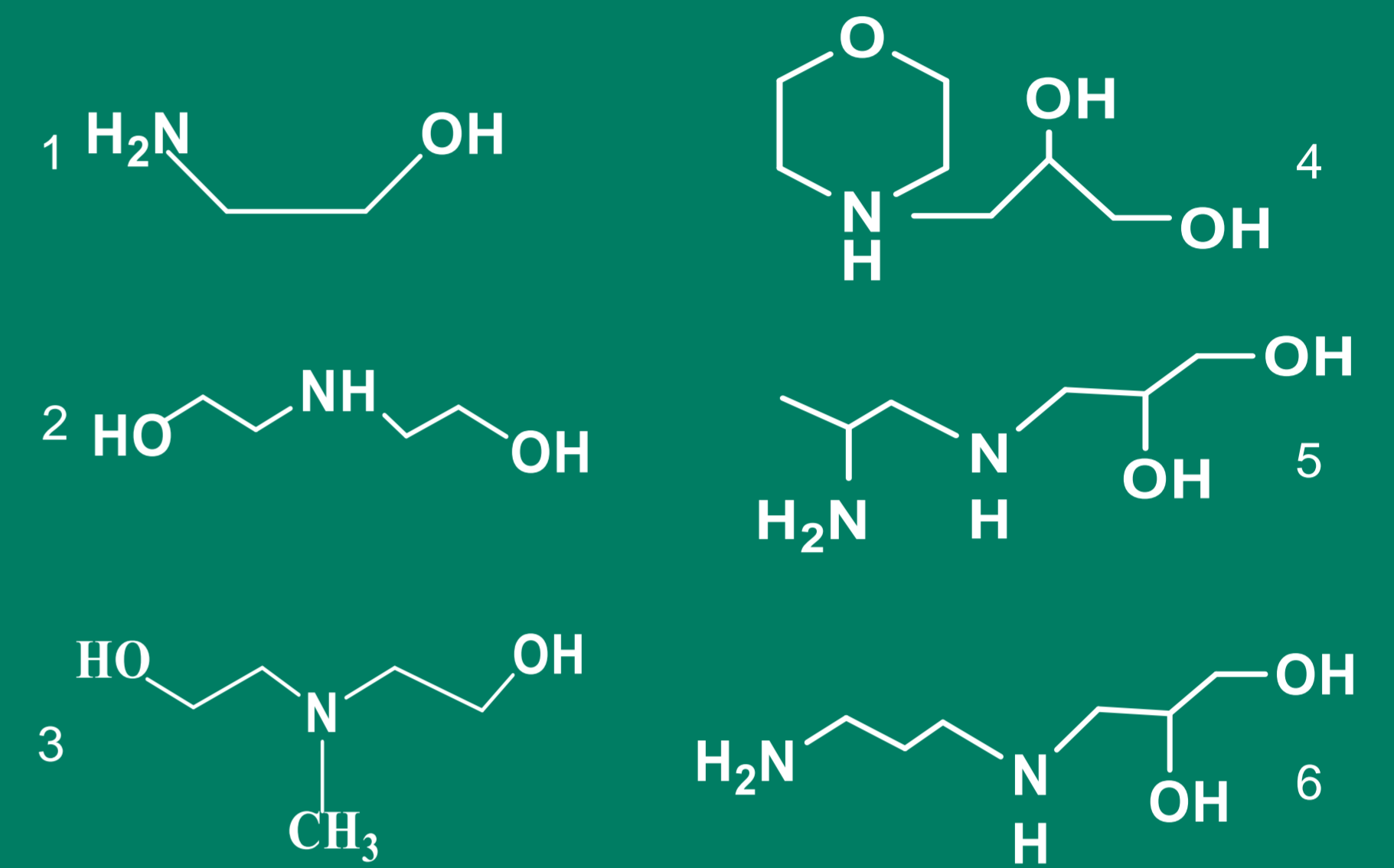
The separation of CO₂ from CH₄ is one of the most important processes in industrial area, Due to CO₂ reduces the heating value, takes up volume, it also causes pipe corrosion.

Owing to their high capacity and low cost, the amine scrubbing technologies remain the leading role in industry. Traditional amines have their own limitations, novel alcohol amines are continuously being developed.

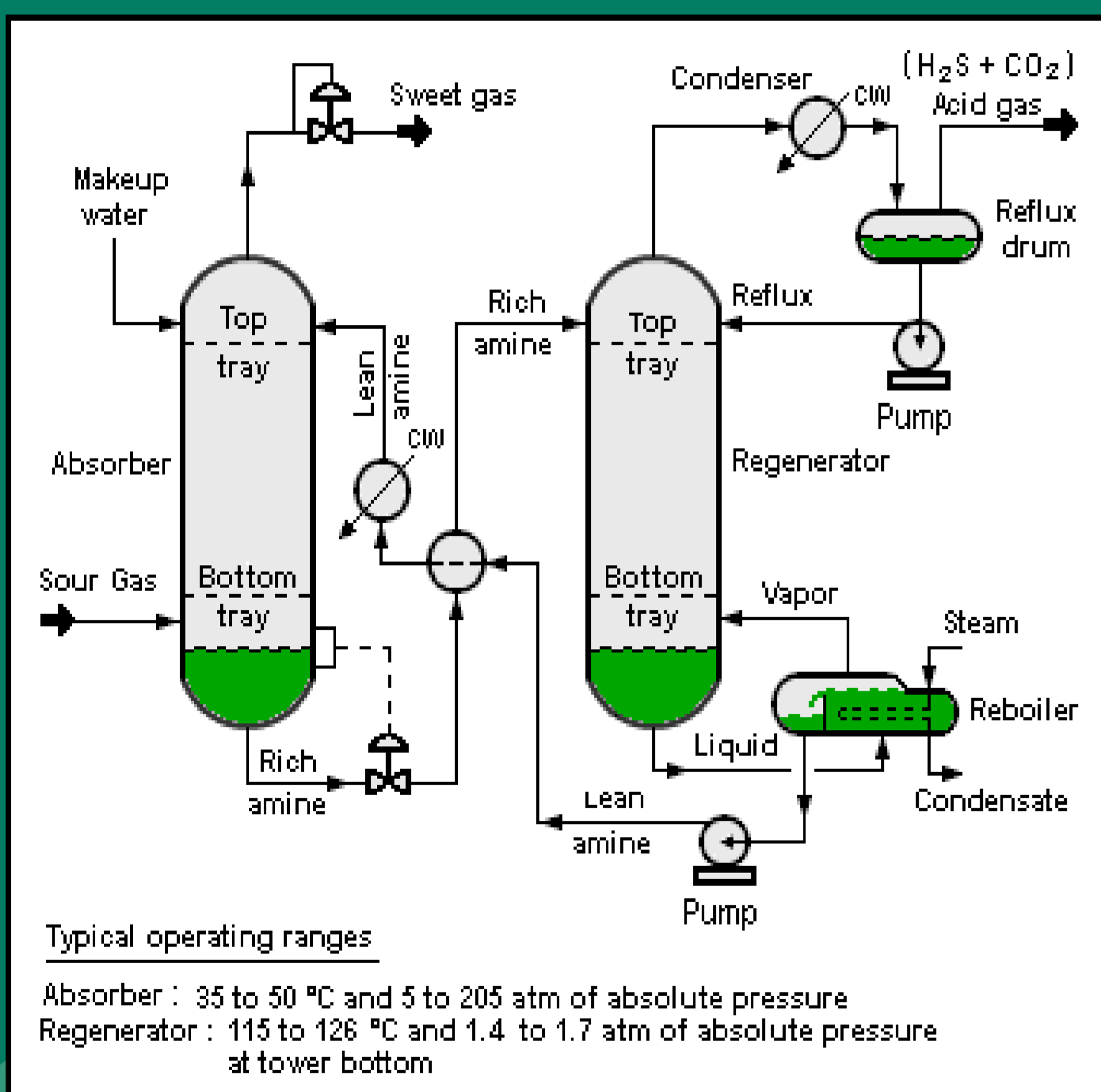
EXPERIMENTAL CONFIGURATION



Conventional amine absorbents	Synthesized alcohol amine absorbents
1. Ethanolamine (MEA)	4. 3-morpholinyl-2-hydroxyl-1-propanol (MHP)
2. Diethanolamine (DEA)	5. 3-[(3-aminopropyl)amino]-2-hydroxyl-1-propanol (APAHP2)
3. Methyldiethanolamine (MDEA)	6. 3-[(3-aminopropyl)amino]-2-hydroxyl-1-propanol (APAHP3)

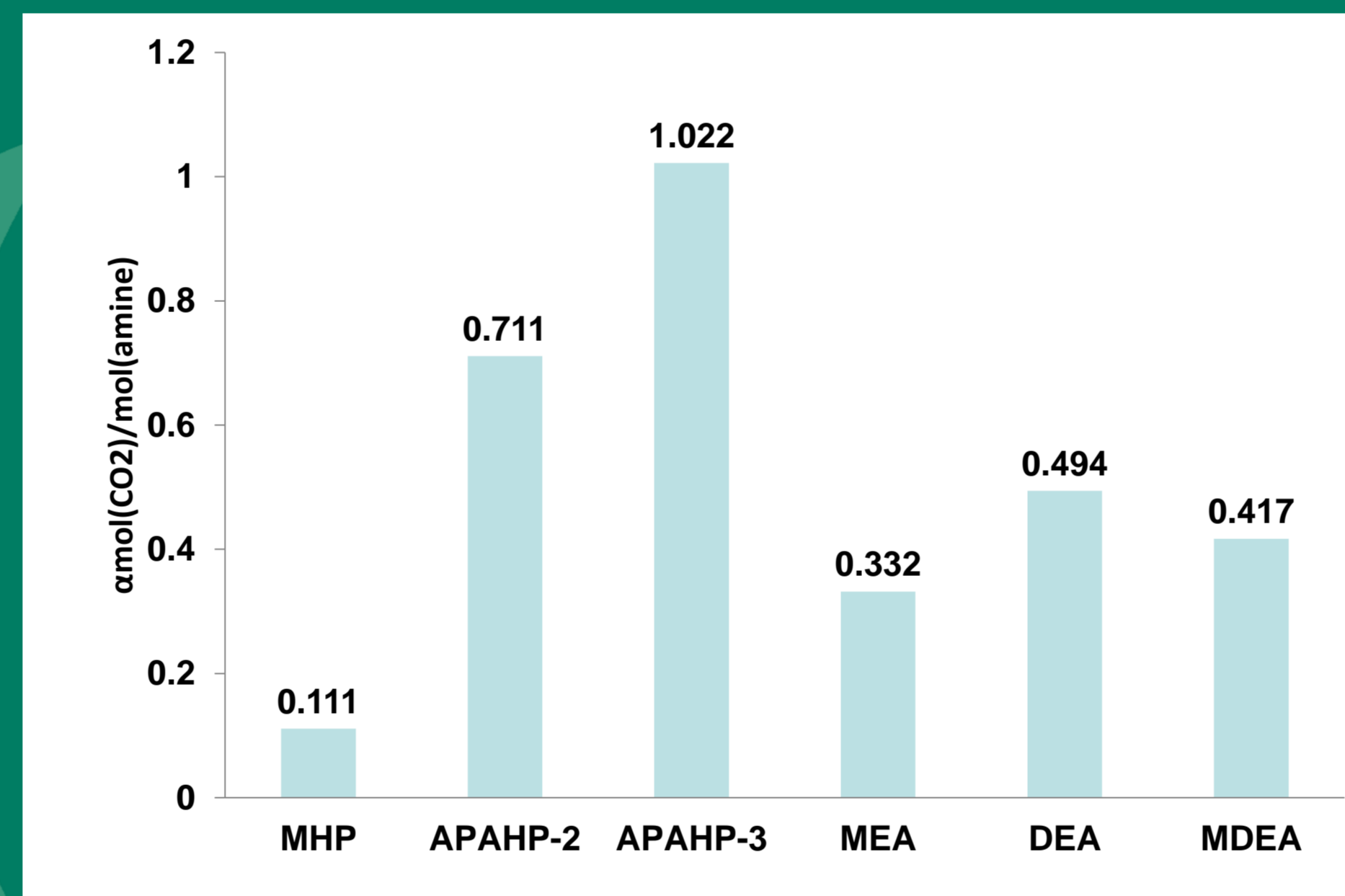


TYPICAL AMINE TREATING SYSTEM

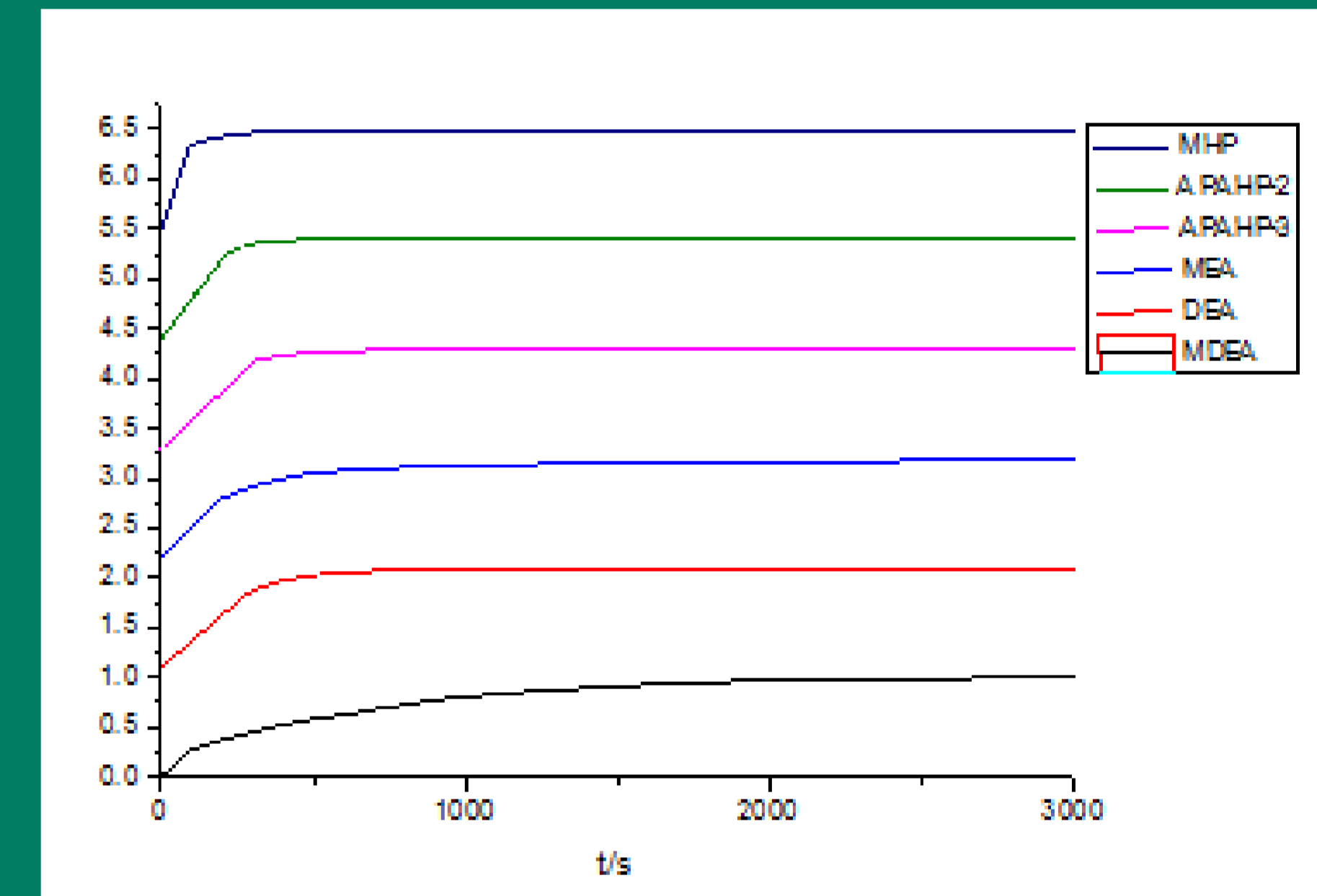


EXPERIMENT RESULTS

30wt% alcohol amines dissolve in deionized water, experiments was operated in Parr autoclave reactor under the condition of 1bar, 40° C, 1500rpm



CO₂ absorption capacity test



CO₂ absorption rate test

Reaction Mechanism

In absorber:

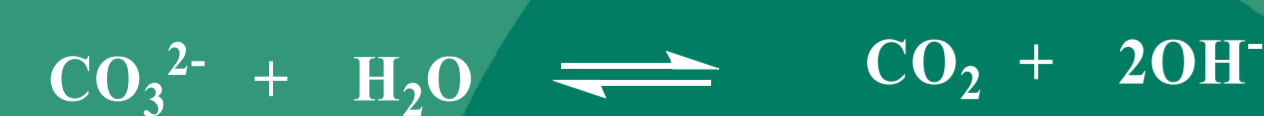
Primary and secondary alcohol amines



Tertiary alcohol amines

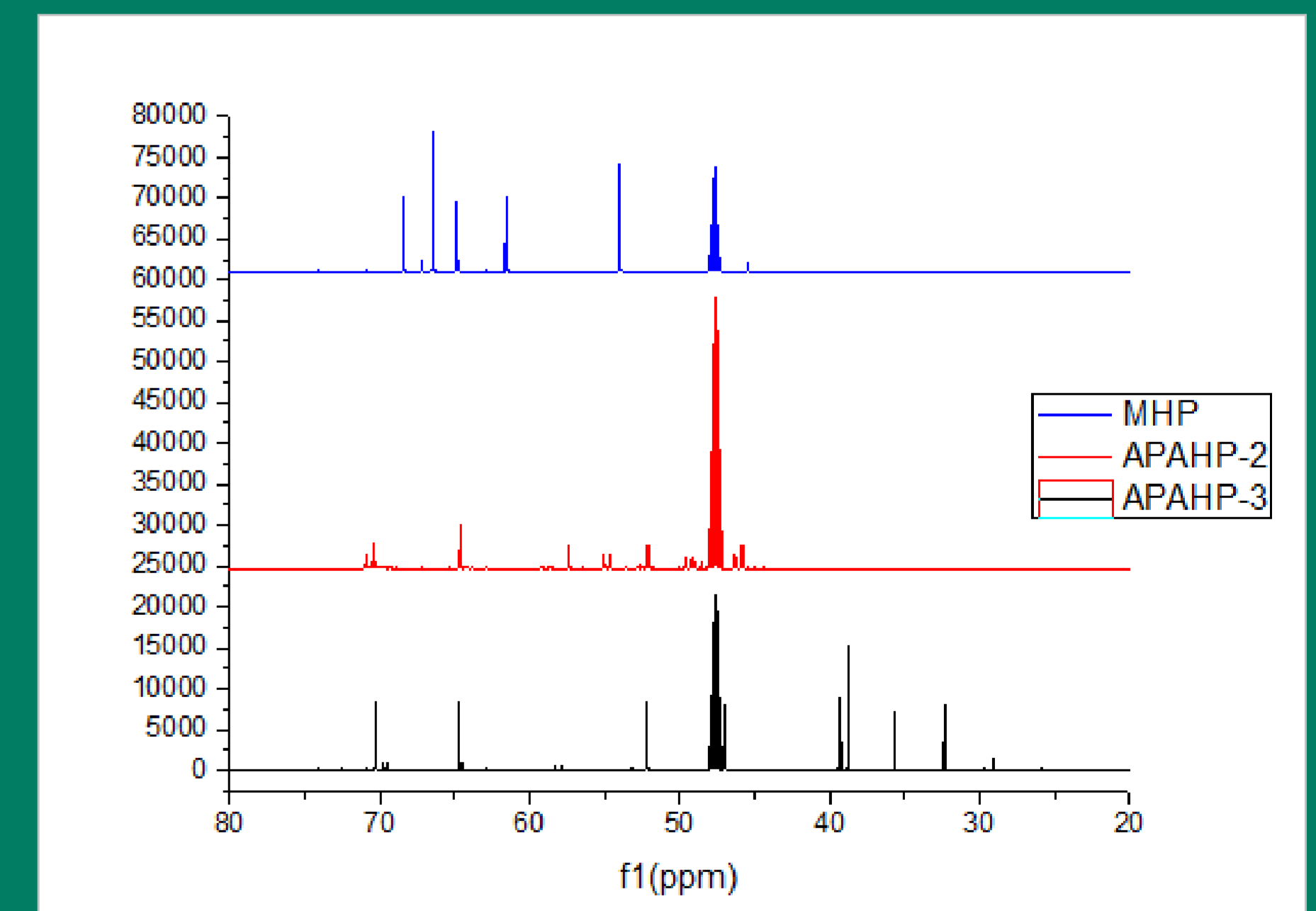
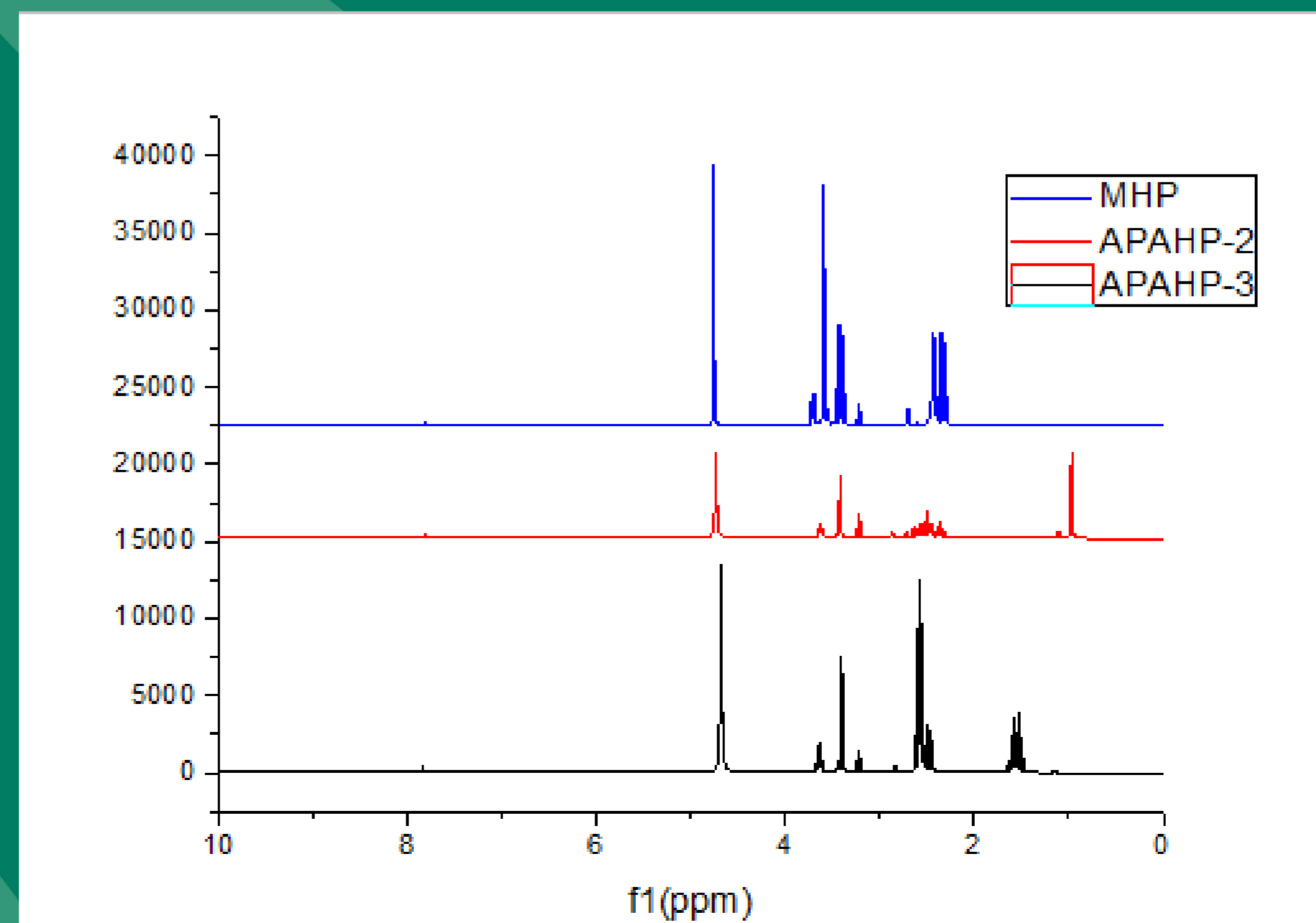


In regenerator:



Nuclear Magnetic Resonance(NMR)

The structural information confirmed by ¹H NMR(Bruker 400MHz) and ¹³C NMR(Bruker 150MHz)



Elements Analysis

To confirm element percent, CHNS test were operated in Perkin Elmer PE2400CHNS.

Name	C(%)	H(%)	N(%)
MHP	46.34	10.64	16.42
APAHP-2	50.44	10.52	8.52
APAHP-3	47.81	12.14	20.28

ACKNOWLEDGEMENT

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Reference: https://en.wikipedia.org/wiki/Amine_gas_treating