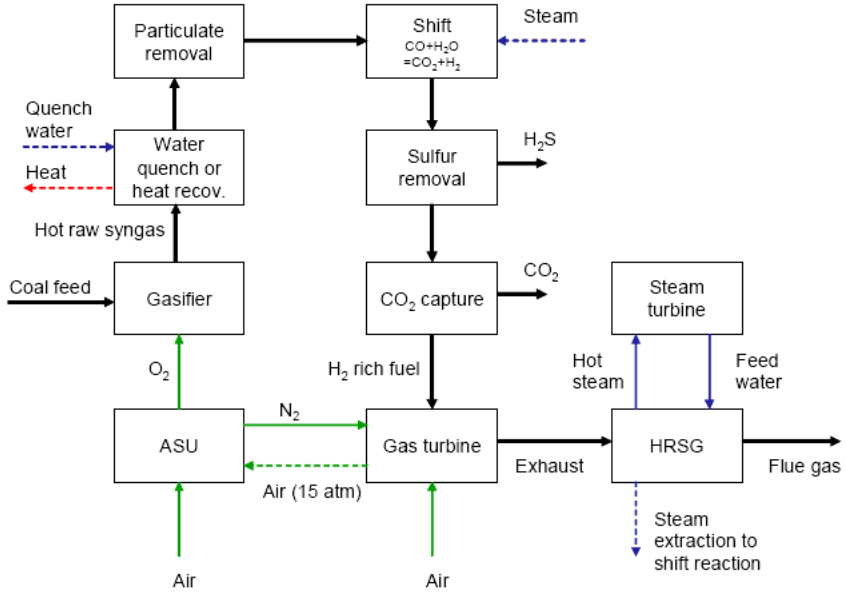
Solvent Screening and Techno-economic Analysis of an IGCC Process

Yaşar Demirel

Department of Chemical and Biomolecular Engineering, University of Nebraska Lincoln, Lincoln 68588;
ydemirel2@unl.edu

This research is for a techno-economic analysis of a power production using an IGCC process (Fig. 1) with an optimum decarbonization section.



Decarbonization will be optimized after screening the following CO2 capture processes (Rate based absorber-stripper) for the following solvents:

1. CO2 capture process by AMP (2-amino-2-methyl-1-propanol) from a gas mixture of N2 and CO2
2. CO2 capture process by DEA (Diethanolamine) from a gas mixture of CH4, C2H6, C3H8, N2, CO2 and H2S.
3. CO2 capture process by mixed DEA and MDEA (methyl-diethanolamine) aqueous solution from a gas mixture of CO2, CH4, C2H6, C3H8, n-C4H10, i-C4H10, n-C5H12 and N2.
4. CO2 capture process by Diglycolamine (DGA) from a gas mixture of N2, O2, CO2 and H2O.
5. CO2 capture process by K2CO3 (Potassium Carbonate) from a gas mixture of N2, H2O, CO2, and H2S.
6. CO2 capture process by aqueous MDEA from a gas mixture of CH4, CO2, H2S and H2O.
7. CO2 capture process by aqueous MEA (monoethanolamine) from a gas mixture of N2, O2, CO2 and H2O.
8. CO2 capture process by mixed MEA and MDEA aqueous solution from a gas mixture of CO2 and N2.
9. CO2 capture process by NaOH (sodium hydroxide) from a gas mixture of N2, O2, H2O, and CO2.
10. CO2 capture process by NH3.
11. CO2 capture process by aqueous piperazine (PZ) (cyclic amine) solution.
12. CO2 capture process by the aqueous solutions of mixed piperazine (PZ) and monoethanolamine (MEA).
13. CO2 and H2S capture process by mixed solvent composed of sulfolane, DIPA (diisopropanolamine) and water.
14. CO2 and H2S capture process by mixed solvent composed of sulfolane, MDEA and water.
15. CO2 capture process by aqueous TEA (Triethanolamine) solution from a gas mixture of H2 and CO2.

Designing, testing (bench or pilot scale), and simulation as well as economic analysis will be performed.