

Progress Report 3 Evaluations

Scores

Group	(sorted scores)								Briefing				Report							
									Sum				(sorted scores)				Sum		Total	÷ 8
1	3.8	3.8	3.7	3.7	3.5	3.5	3.3	3	28.3	13.4	13	13	12.5	11.7	11	11	9.5	95.1	123.4	15.4
2	3.9	3.7	3.7	3.6	3.4	3.3	3.3	3	27.9	13.6	12.7	12.5	12.5	12.5	12.5	12	12	100.3	128.2	16.0
3	3.7	3.7	3.5	3.5	3.5	3.5	3.3	3.3	28.0	13.8	13.5	13.5	12.8	12.3	12	12	11.5	101.4	129.4	16.2
4	4	3.8	3.6	3.5	3.5	3.4	3.3	3.2	28.3	13.6	13	12	12	11.9	11.5	11	9.5	94.5	122.8	15.4
5	4	4	4	3.9	3.8	3.6	3.5	3.3	30.1	13.9	13.5	13	13	13	13	12	11.5	102.9	133.0	16.6
6	4	3.5	3.5	3.5	3.4	3.3	3.3	3	27.5	13.8	13.5	13.5	13.5	13	13	12.7	12	105.0	132.5	16.6
7	4	4	4	3.9	3.8	3.8	3.7	3.6	30.8	13.9	13.5	13	13	13	12	11.8	11.7	101.9	132.7	16.6
8	4	3.7	3.6	3.5	3.3	3.3	3.3	3.1	27.8	13.7	13	12.5	12	11	10.6	10.5	10	93.3	121.1	15.1
9	3.8	3.7	3.7	3.7	3.6	3.5	3.2	3	28.2	13.6	12.5	12.5	12.5	12	11	11	10	95.1	123.3	15.4

Verbatim comments in random order

Presentations

Group 1

- From one group:
 - Good summary
 - Good description of acid gas removal technology
 - Good improvement on this report
 - The order to discuss the acid gas removal and water-gas shift reaction should not be reversed.
 - No page number
- *Presentation:*
 - Discussion of water-gas shift reactor
 - Discrepancy between literature and ASPEN design for Claus process
 - Good PFD of Rectisol process
 - Best presentation thus far
- *Report:*
 - Grammatical errors; certain things capitalized that shouldn't be, missing words, etc.
 - Comparison of various AGR methods
 - Health and safety considered
 - Does not discuss ASPEN thermo package
- Presentation –3.8 Looks very comfortable in front of a crowd
 - In the water gas shift reactor, what did you mean by CO2 being an inert?
 - What was the point of inputting the water at a higher temperature than the reactor?
- Acid gas removal was unclear.
 - PFD was incorrect.
- From one group:
 - Great improvement
 - Too many figures of outside work
- From one group:
 - Looked down on screen

- Provide stream table from ASPEN simulation
- Grammar, spelling, etc.; not proofread
- Incorrect units
- Report: -Outstanding summary of the sulfur removal and water gas shift processes.
Presentation: Roland did great job on speaking of commercial technology and utility cost; however the order of his power point slide are a little bit arbitrary. He first talked about acid removal technology, then move to topic of gasifer, and lastly he talked about the acid gas removal again.
- Great improvement in the work! Check the flow diagrams to make sure the components are properly subscripted.

Group 2

- From one group:
 - Good job overall.
 - Water Gas Shift reaction was shown as not in equilibrium, but is supposed to be in equilibrium.
 - Why is oxidation to molecular nitrogen required (doesn't make sense)?
- Absorption by physical process. Rectisol process. Water gas shift reaction versus HT and LT reactor.
Conclusion gave good recommendations on what to do next.
Paper: 3 pages of tables and pfd, needs to be organized better. Integrate the tables or pfd to enhance your description. You point out the insufficient methanol feedstock, this is good cause you are aware and will deal with it later. Nice Apsen description.
- From one group:
 - No ASPEN results in presentation
 - Not too quantitative approach to discussion
 - Flow rates in PFD would be helpful
 - Would have wanted a paragraph describing result tables before actually presenting them
 - Thorough description of process
- Report: Minor deductions for having blank pages. Report itself contained interesting and relevant information. Aside from the blank pages, good layout.
Presentation: Caitlin did great jobs on the slides and speaking; however, she focus on the slides more than having eye contact with audiences. Also she presents the negative results.
- The report is easy to read, with good tables, summaries and diagrams. Would liked to have seen the group go ahead and scale up the process to meet the 5000 MT/day methanol requirement.
- Presentation-3.7 seems nervous in front of the crowd. Keeps looking up what were you talking about when you said
"Sizing of the Claus unit is based on the volume of gas input; a lower nitrogen concentration in the feed requires a correspondingly smaller, and therefore cheaper, Claus unit. It is important to note that this process requires the oxidation of all components to molecular nitrogen in order to prevent the plugging of liquid and sulfur lines." Pg 7 about the acid gas removal and claus
- *Presentation:*
Good description of Rectisol process
Did not explain why oxygen Claus process was chosen
Report:
Good PFD
Report has some repetitive/overused words

Unclear description of Claus process

- From one group:
 - No page number
 - Using double-space can be better for readers to read easily
 - Good discussion on acid gas removal and water-gas shift reaction

Group 3

- Descriptive ASPEN approach
Good work overall
Sheida did a pretty good job explaining the ASPEN Process and syngas technology that is utilized
A little lack of explaining the technical aspects on the ASPEN part
- From one group:
 - The whole table should be placed on one page. Try not to let it separate into two pages
 - Good and clear PFDs of acid gas removal and water-gas shift reaction
 - Reference should start on a new page
- From one group:
 - Tried to cover too much material in a few minutes
 - Summary was too long
 - Good discussion of WGS
 - PFD needs more details
 - Costing was not detailed
- From one group:
 - Good explanation of Claus process in the presentation. I think units should be MT/hr.
 - I don't think Mton is a unit, use either MT or tonnes.
 - When discussing flow rates make sure you divide the moles or mass by a unit of time.
 - In the AGR section you stated the pressure as 350 Pa, that is extremely low. I am not sure if that was a mis-type or if the system needs to operate under vacuum.
 - Check eqn. 1 to make sure its balanced.
- Report: -summary should be shorter, not tell what aspen units used
-put previous report in references
-good econ. calculations, but cite which report you calculated amounts of coal/O₂ necessary.
presentation: Talked really quickly,
- *Presentation:*
Very fast run-through of gasifier
95% removal of sulfur is not enough for environmental requirement (Selexol process)
Detailed; covered a lot of information
- *Report:*
Good PFDs of AGR and water-gas shift
Covers ASPEN thermo packages and reasons for choice per package
Preliminary capcost included
Does not really describe choice for ASPEN reactor choices
- From one group:
 - Presentation had too much information, too rushed
 - Good explanation of 2 water gas shift reactors

- Slow down when speaking . Speak in "bullet points" with detail for just the main topics. Talk was technical and had solid logic.
- Paper:* *TOC is a plus. Good use of PFD and tables. Logical and supported claims well.

Group 4

- From one group:
 - No mention of absorption process
 - Would like to see a PFD of process
- There needs to be more results in the executive summary, it was too general. Would liked to have seen a PFD in the report, with the data in tables, to make it easier to read. The units seemed all over the place, and not in metric units as determined in class. The H₂:CO ratio after water-gas shift reactor should have been modified to 2:1 ratio. It seemed that not much work was done on the acid gas removal part, and the amount of sulfur being removed was not mentioned.
- *Presentation:*
Short description of AGR
Too many sig figs
Report:
Describes AGR and water gas shift theory well
Does not describe ASPEN assumptions and reasons for reactor types, thermo package, etc.
Organized and easy to follow
- From one group:
 - Clear presentation.
 - Some sections of the paper weren't necessary.
 - Grammatical errors as well as some formatting problems.
 - Be more consistent with units (you used both tonnes/day and kgmole/day).
 - Appendix was very clear.
- Report: -In summary say what method of acid gas removal/recovery used.
 - Some of the sentences were unclear, make them less convoluted.
 - Aspen's split fraction of H₂S shouldn't be 0, it should be almost zero, 0.1 ppmv.
 - Some of the carbon dioxide usually also leaves with the acid gas removal, it doesn't all stay in the syngas stream.
 - There was no talk on the technology of acid gas removal. Even though it can be modeled as a basic separator in aspen, it still needs to be designed.
- Presentation: Went into a lot of detail.
- RGibbs reaction as Model. Added H₂O to WGS.
Acid Gas reactor – split fractions. Extent of reactions transition to number of Kg per day. Can calculate equilibrium concentrations of compounds. How did you calculate two temperatures for K value?
Paper: Extensive and thorough handling of process description. Well written and presented nicely.
- From one group:
 - Questionable amount of coal input, suggest to recheck calculation and utilizing the CO shift reactor rather than adding more coal input
 - Detailed explanation of the acid gas removal and the CO shift process
- From one group:
 - ASPEN, not BFD, was presented
 - Some unnecessary information in presentation
 - Thermo package not mentioned

- AGR technology was not mentioned
- Thorough calculation discussion; table of results preferred

Group 5

- Scope of process covered. Acid, S, wgs, aspen, costing, NMP purisol High sulfur concentration. Justified why purisol. Catalytic stage. Very detailed and supported logic. Came to a conclusion and identified capital cost.
Paper: 35K MT/d of NMP requires a lot of solvent to achieve, unclear if Purisol in Industry can achieve levels. Why is Purisol recommended over Rectisol when Gasification book recommends Rectisol? Still unclear as to the need of the manipulator. Scope well covered and present technical dialogue and data in a manner that is consistent with an Engineering Design report. In Table 4, indicate that the data is[sic] not available
- *Presentation:*
Good explanation of physical solvent choice vs. membrane chemicals, etc.
Good description of water-gas shift
Manipulator use
Report:
Purisol was chosen as the AGR unit
Seems more of an actual report than just a progress update
- From one group:
 - Good usage of PFD and Aspen tables included
 - Can consider decreasing the amount usage of NMP solvent by increasing the number of stages in the absorber.
- From one group:
 - Presentation was good. Liked the tables.
 - Not sure about your units “5K MT/day” and “5K MT/d” both seem a little strange, but going back and forth between the two definitely isn’t good.
 - Check “figure 1” BFD, the flow rates shown do not close the material balance.
 - Confirm with the literature that Purisol can achieve 0.04 ppm. My understanding is that only Rectisol can get down to 0.1 ppm.
 - Can’t find \$1.2 M in your appendix for Capcost, I think it showed \$300,000.
 - With all this said, your report still has the best writing and some effective tables.
- Your word choice is often slightly off (“extremely suited” for example). I don’t know that you needed tables 1-3, you probably could have explained your results in words without going over every stream and its conditions. You explain what you did clearly, but don’t give much discussion to why or how your choices beat out possible alternatives.
- Good ASPEN description
Nice data collection method by putting them into tables
Angelica did a great presentation. She looks calm and confident while presenting for her slides. Her presentation was informative.
- Report: -Good diagrams but improve paragraph spacing.
Presentation: Angelica has great speaking, nice table for costing, and detail on technical terms which is one of the best presentations on that day.
- From one group:
 - Very well written with excellent block flow diagram
 - Number equations

Group 6

- Paper: PFD is very good and clear. Others should follow this example. Keep doing what your doing.
- Good and in-depth description and explanation on the result of Aspen simulation.
- The report is short and to the point. You probably didn't need to put Table 1 in its entirety. In your conclusion you say that process "intricacies" will affect the material balance minimally, but you don't justify the assumption.
- From one group:
 - Slides are difficult to see; numbers in table are too small
 - Writing was really good
 - Rectisol choice not explained
- From one group:
 - Everything was clear and justified.
 - Had a few grammatical errors.
- From one group:
 - Well written report, with good organization
 - Make tables bigger
- Extremely detailed though the PFD was difficult to follow. I would suggest rearranging the PFD blocks a little better because it looks a bit difficult to follow.
- Report: -Almost perfect, but don't need to dedicate an entire page to references and make sure to shrink tables to fit within margins
Presentation: Nazia has clean voice with great speaking. But the fonts on slides were too small to see. She explained well on technical terms and demonstrated great results. She also included PFD of process.

Group 7

- *Presentation:*
ASPEN simulation very small-however explained really well
Rectisol process discussed
Good discussion of water-gas shift
- *Report:*
Not much economic analysis (as compared to other groups)
Concise, straight to the point
Good BFD
Well done
- Very technical. Use of numbers
Paper: Calculations and stream tables are solid. Not sure why you needed to Rstoc models to get conversion or to was to simulate real process.
- Your report is easy to read and thorough. I think you've done an excellent job condensing all of your arguments into concise blocks. Difficult to find anything technically incorrect as well.
- Report: -Group 7 did good job on explaining acid gas removal and water gas shift reactions. However, the report is missing previous materials.
Presentation: Nick explained each step very well. He has clear voice, very comfortable and smooth demonstration, and has eye contact with audience whole time which is one of the best presentations on that day.
- From one group:

- Abstract should focus on the progress of the week.
- Design results are clear and detailed.
- There is no economic analysis.
- Try to avoid showing results in the recommendation section.
- Thorough and detailed. The PFD was well drawn and very clear. Was the Gibbs reactor specified with equations and/or temperature approach?
- From one group:
 - Good presentation; table for results recommended
 - Average writing; inappropriate paper format
 - Some thermo package might be more appropriate for other processes
- From one group:
 - Very concise, but good report
 - No costing

Group 8

- * Good background description on coal
- * Lacking technical explanations on ASPEN
- Good PDF, good description of acid gas removal, succinct report. SHOULD have mentioned overall goal in the beginning.
- From one group:
 - There was no abstract or conclusion/recommendation.
 - Reactions were within text.
 - A lot of unnecessary information.
 - Units should be in MT/hr not kg/hr or kgmol/hr.
 - BFD for Acid Gas Removal system is wrong.
 - No steam shown coming into to the water gas shift reactor (one of the key components in the reaction).
 - Should consider a different reactor for the water gas shift.
- *Presentation:*
 - Seems like very little amount of coal is used
 - Discussed safety and environmental considerations
- *Report:*
 - Equations for creation of elemental sulfur would be nice
 - Chose rectisol...detailed sulfur removal section
 - Aspen and stream tables kind of difficult to interpret
- From one group:
 - The title of the report should be changed (not "gasification" and "Progress Report on a Study in Gasifier Technology").
 - There is no abstract or summary.
 - Data table is clear.
 - There is no economic analysis.
- From one group:
 - Thorough report
 - Missing two very important parts: abstract, and conclusion to state important values.
- For the presentation, it seemed rather short. The chemical formulas on the slides need to be properly subscripted. I would have liked more detail in presentation about the results. As for the paper, there was no abstract or summary, which would have helped. There is too much detail about the real industry, and

- not enough about their design. The diagrams and tables should be upright, to be easier to read.
- Overall goal mentioned. Calculated 6.31MT/day on a dry basis. Mentioned technology rectisol. Mentioned alumina as catalysts. One stage versus two stages discussed. Environmental concerns. Conveyor belt may explode.
- Paper: Include a summary or abstract. Paper kept to the topic of acid gas removal and recovery, good. Concise. Use Landscape for your stream table format. Identify what Aspen Model used, Rstoic, Rgibbs etc. Describe your Aspen process a little more detail.
- From one group:
 - Lacking technical information in presentation
 - Blocks are messy
 - No abstract or summary; no project description; bad format
 - Good individual process description
 - Fix page orientation so it's easier to read
 - Appendix wasn't helpful; not referred to

Group 9

- * Descriptive presentation, especially on the ASPEN simulation part
 - * Good voice projection
- Didn't mention contributions, things mentioned in background unnecessary, well presented results in progress summary.
- The report had good detail about their design and methods. Would liked to have seen a PFD of their report. It is easier to grasp the flow rates if they are in Mton/hr, as determined in class.
 - Report: -Group 9 lacks in explaining technical terms even though they cover all the required materials. Presentation: Man Kite focus on explain trivial materials more than focusing on technical terms. And there is no overview picture before he focused on the topics. He did great job on acid gas removal, waster gas shift. Also he explained well on k-values. There was no eye contact between him and audiences. His speech did not match his slides sometimes and there is no conclusion.
 - From one group:
 - Unclear reasoning for why the ratio was correct before water gas shift
 - Good improvement in writing
 - *Presentation:*
 - Gray background on plot of data
 - Discusses relationship between k value and T very well
 - Good simulation of AGR in ASPEN
 - Report:*
 - Perhaps use the formulas to show the processes
 - NMP – high selectivity
 - After acid gas removal stage, flowrate of water should not be 0
 - From one group:
 - Last slide left us hanging but he knows material well
 - Good format but not too detailed
 - No sulfur recovery technology
 - No PFD
 - Appendix was good but not referenced in the paper
 - Presented graphs well and talked in detail about the logic used.
- Paper: Looking at your Aspen stream tables why do you add 6000kmol/hr or H₂ to your gasifier as a

feed component? Will the cost of Hydrogen be added to your costing?

- From one group:
 - Good presentation.
 - Background was not necessary, but intro was good.
 - Table was good, but units were not consistent (kmol/hr & MT/day, pick one).
 - Lots of results, but no explanation.
 - Appendix was hard to follow

Instructor's two bits

I'm not adding any more than it is necessary.

Expectations in progress

- Not repeating what I said in class either.
- But I did forget to repeat something I said first week of class. And that is the organization of your progress report should follow the AIChE guideline for the final report. The idea is that if you have material already organized that way, your final project report can be put together extremely quickly! Apparently few people paid attention. Or have learned how to work smartly.