## ChEn 310 - Exam Questions

- 1. Discuss at least two reasons why most of the nations current wind power is in California. Possible discussion could include afternoon breezes create wind when peak power is needed, subsidies, etc.
- 2. What are some of the advantages to fast breeder nuclear reactors? Why have they not been used? Do you think a time will come when they will be widely used? Please discuss.
- 3. Discuss some reasons why so much of the US electricity generation comes from coal. Do you think that this is good or bad? Why?
- 4. Discuss the constraints on integration of wind energy into electric utility systems.
- 5. If I were an investor for a new nuclear power plant project, what are the costs of nuclear energy that I should consider?
- 6. Why are existing biomass-to-electricity plants so mall and what is the drawback on that?
- 7. Why are renewable power sources growing at such a high rate and what contribution are they expected to make to electricity in the future?
- 8. In your opinion, what is the future of nuclear power and why?
- 9. What contribution can the average citizen make to the energy crisis?
- 10. Name three renewable energy resources. Compare and contrast them. Give at least three sentences for each resource.
- 11. What are some considerations when choosing an energy resource? Give at least three considerations. Give examples.
- 12. What are some of the concerns with coal power? Give at least three and explain.
- 13. What are some of the factors that keep the U.S. from becoming a hydrogen economy and how can we overcome this?
- 14. Where does the U.S. get most of its energy from? (What source?)
- 15. Give a brief description of alpha decay.
- 16. Pick a country and describe why they use the relative amounts of energy sources that they do.
- 17. Pick a state and describe why they use the relative amounts of energy sources that they do.
- 18. Compare/contrast Utah Coal with Wyoming Coal and explain why Wyoming Coal is being used more.
- 19. How will we be able to continue to drive our cars in 2050?
- 20. What are the cheapest sources of electricity? Why are they the cheapest?
- 21. What are the limitations of solar power?
- 22. Why are renewables such a small percentage of our power portfolio, and is this likely to change? Why or why not?
- 23. What will be the number one source of primary energy in 2050? Justify your answer.
- 24. Where should the government channel the most research dollars? Justify.
- 25. What factors make Utah Coal better than Wyoming Coal?
- 26. Where do we use the majority of energy in our homes?
- 27. How is hydrogen currently produced and what is its main use?

- 28. In your opinion how much longer will we have petroleum? What are the factors in determining that number for you?
- 29. How will nuclear power play a role in our future? What are the set backs to nuclear energy and are they really set-backs?
- 30. What are the draw backs to biomass? Why is it difficult to operate a plant built for large scale energy production?
- 31. Discussion in your community has centered on electric power recently, as the demand for electricity in your community has increased with increasing population. After analysis, it has been determined that the only way to meet the demand is to build a new electric power plant. The issue has been narrowed to two proposals which were in a heated debate before the last town council meeting. One is to build a coal fired power plant and use it with biomass from a local saw mill. The other is to build just the coal fired plant. As a representative of the saw mill you've been asked to present before the town council at its next meeting why the combined plant should be built. Please present three arguments that you would give to the council as to why this is a good idea.
- 32. Could nuclear power be considered a source of green power? Why or why not?
- 33. Why is a combined cycle power plant able to have efficiencies of more than 50% while a regular power plant hovers around 30%?
- 34. Biomass has various environmental impacts. Please discuss two examples of both positives and negatives.
- 35. Because of the increasing pressures to limit CO2 emissions, industry has researched alternative methods to continue combustion with no emissions. Please discuss three methods CO2 for sequestration.
- 36. What factors have led to countries like France to pursue nuclear energy?
- 37. Why is nuclear power predicted to decrease for the next 40 years?
- 38. Which of the primary energy sources in the United States are projected to increase in the next twenty years and which are projected to decrease?
- 39. Discuss in one paragraph the advantages and disadvantages of wind power.
- 40. Explain the advantages and disadvantages of the proposed hydrogen economy.
- 41. The world's largest energy source (by production and BTU) is currently crude oil, with coal then natural gas following close behind. Smaller energy sources are led by hydroelectric power, with nuclear very close behind, and others following afterward. Discuss the trends (increasing or decreasing) that these energy sources are following, and comment on the pros and cons associated with the growth and decline of the energy sources mentioned.
- 42. Put yourself in the position of China or India, with huge energy demand growth forecasted for the future. Keeping in mind current technologies, which energy sources would be the most viable to your country and how/where would you implement those technologies to successfully meet the needs of your country (remember that demand is not the only factor, but environment, health, and sustainability play a role).
- 43. You have recently been appointed to the role of energy secretary of the United States. What programs would you implement to reduce consumption of electricity? What technologies would you emphasize and encourage investment in?

- 44. What is the major limitations with alternative energy sources and why?
- 45. How is it that Denmark can obtain such a high percentage of its energy from renewables, but the US cannot (or at least not currently)?
- 46. How were the first steam engines used?
- 47. What are the five top countries that have made the largest investments in wind generated electricity, and what are the main reasons why they have.
- 48. What are the main conflicts behind using nuclear energy?
- 49. What is one important thing that everyone in the world needs to do in order to not use up all of our resources?
- 50. Why are renewable forms of energy more used, and why will they never be a large percentage of the US's total energy use?
- 51. Who are the top five users of coal?
- 52. What impediments are there to using more nuclear energy in the U.S.?
- 53. Is it possible to use renewable power, such as win, as the primary source of electric power? Why?
- 54. What is your solution for transportation fuel from now until oil reserves are depleted?
- 55. What are the two types of biomass and how are each used?
- 56. What are the major concerns that people have about nuclear power?
- 57. From where does the US get most of the energy that it consumes?
- 58. Why is Wyoming Coal typically preferred to Utah Coal?
- 59. Categorize the following renewable energy sources as continuous or noncontinuous and explain your reasoning.
  - Geothermal
  - Wind
  - Solar
  - Biomass
  - Hydro
- 60. Why does replacing gasoline with ethanol fuel reduce gas mileage?
- 61. What is the future outlook for renewable energy sources? Discuss the benefits and challenges it is facing.
- 62. Discuss the differences between light water and heavy water reactor.
- 63. If oil imports were suddenly cut off due to a political reason, what energy source would be the most suitable to replace it? Please give your reasons and the possible impacts it had on the economy and the environment.
- 64. Describe the past arguments against nuclear energy and their current relevance today.
- 65. List three ways that our society could reduce its dependency on foreign oil, discuss the likelihood of each method and what is preventing use from moving in that direction.
- 66. What role should hydrogen play in our future? List pros and cons of its use.
- 67. Explain how the Rankine cycle works and how it improves efficiency in steam generated electricity. Use figure below.
- 68. Describe the advantages and disadvantages of a diesel engine versus a gasoline engine.
- 69. Why is energy data often so difficult to interpret?

- 70. What are ExxonMobil's short and long term goals?
- 71. ExxonMobil claims, "...we also strongly believe in investing in research and development as a means to develop potential future profitable business opportunities...", but has withdrawn all funding into coal extraction, nuclear and solar energy. Why?
- 72. With all the talk about hybrid and fuel cell vehicles, why does ExxonMobil predict Natural Gas vehicles to capture 8% of the market by 2030 while the others capture 4% each?
- 73. Rank the common types of power from least to most expensive by cent/kWh.
- 74. What are the ways that we are developing to make electricity production more efficient?
- 75. Why has the cost of electricity remained constant over the last thirty years?
- 76. Briefly explain the effect that the internal combustion engine has had on the energy industry.
- 77. How is most electricity production limited by the Carnot cycle, and how does this limit or promote certain forms of energy?
- 78. What are the advantages and disadvantages of fast breeder reactors and which should be pursued as a future technology for the United States?
- 79. Draw and describe the Rankine Cycle.
- 80. What is an IGCC?
- 81. What are the methods for CO2 sequestration and which ones are the most reliable?
- 82. List at least five types of biofuel and what biofuel is used for?
- 83. How do you think the future electricity needs should be solved and why? What are the major problems that need to be overcome before it can be used?
- 84. How should power for cars be produced (battery, hybrid, hydrogen, other) and why?