Prelim Design Questions

✓1) Describe the process for producing ammonia from methane and air. Include types of reactors, reaction temps. and pressures used.
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✓2) What are the responsibilities of the engineer?

✓3) Where does Bromine occur naturally? How would you remove Br2 (gas) from an aqueous solution of NaBr, NaCl and other salts?
425

✓4) Where is iodine obtained from?
428

5) Suppose superheated geothermal steam were available with composition of 99% H2O and 1% CO2. Outline a process to derive the most work or energy possible from this stream. What final T and P would you use ? →How could you further reduce the outlet pressure (below ambient) for the turbine? What should be done with the CO2?

✓6) How would you separate O2 from air? Sketch a Cryogenics plant.

✓7) How would you remove CH3Br from the air (conc. ≈1% —> .02%)

✓8) For CH3Br adsorber, assume raoults law and draw the adsorption diagram.

✓9) How do you find minimum reflux? How much more than minimum should real reflux be?

✓10) How do you find height of adsorption column?

✓11) How do you find gas and liquid phase resistances?

✓12) What do you do with the CH3Br -oil ?

✓13) How would you separate CO2 from air?

✓14) How would you separate H2 from air?

✓15) Identify several ways of making H2.
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✓16) With 60°F cooling water & 100 psig steam, devise a process to provide water at ≈32°F without refrigeration.
LiBr adsorption cycle?

✓17) How is your research relevant to chemical engineering?

✓18) Devise a process to remove a small concentration of mercaptans from a light hydrocarbon mixture.

19) How do you make silicon?

20) Consider a magnetic hard disk drive. In normal operation, it spins at high rpm and the magnetic head does not come in contact with the disk. With use, the disk starts to wander, and it eventually hits the head, causing the disk to "crash". What might be done to prevent a crash?

21) name some solid lubricants. - talc - sulfur - graphite

22) Consider a centrifugal pumpwith a shut-off valve on its output stream. What happens to the power consumption of the pump if the valve is closed? Why are valve not placed on the inlet sides of pumps?

23) Consider a positive-displacement pump(ie: a piston compressor) with a shut-off valve on its output stream. What happens if the valve is closed?

24) Draw the x-y curve for water-ethanol. How would you purify ethanol above 95% ?

25) You have a continuous distillation set-up. how would you save energy (ie: reduce heat duty at the reboiler) ?

26) Describe the Haber process!!!! NH_3 synthesis

27) What is a maximum boiling azeotrope? Does it exhibit positive or negative deviations from Raoults law? Will the azeotrope be recovered in the distillate or bottoms?