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# 19.0.A Daily Outline

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Here are all the references and links (including the attached questions that were used during the inclass activity).

"Refractory Information" - http://www.refractoriesinstitute.org/aboutrefractories.htm
"Steel Properties" - http://www.mace.manchester.ac.uk/project/research/structures/strucfire/materialInFire/Steel/default.htm
"Glass Manufacturing" - http://www.consol.co.za/business/why-glass/glass-manufacturing-process
"Cement Manufacturing" - http://www.cement.org/cement-concrete-basics/how-cement-is-made
"Aluminum Production" - http://www.aluminiumleader.com/en/facts/extraction/
"Iron Ore Processing" - http://www.steel.org/~/media/Files/AISI/Making%20Steel/Article%20Files/ironore.ashx

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April 2, 2015 - Chem 444A: Refractory in Industrial Applications

Assemble in groups of 5 with the following roles:
Assign two members as spokepersons, these should be people who haven't had the chance to present a poster in front of the class.
Assign one member as manager, recorder, and reflector to members who haven't had that specific role recently.

1. First read through the informational passages on refractory. Refractory is a heat resistant material that is used to protect outside structures that are not as heat resistant to the high temperature process contained. An example of refractory that you might be familiar with is a house hold brick-lined fireplace. With what you know of heat transfer, what is happening with the heat in a brick-lined fireplace fire that allows people to safely start fires in their homes? Record answers on the recorder report.
2. Read through the section on the effects of temperature on steel. From your previous knowledge of heat thus far, what is happening at the atomic level as heat is added to steel that would explain these phenomena? Record answers to this question on the recorder report.
3. Read through your specific industrial process. Pay close attention to portions that concern heat in process. These processes require some sort of fire burner that provides a great deal of heat to generate these high temperatures. What is happening during these high heat portions of the process? Why do you suppose these high temperatures are necessary for this process? Record answers to these questions on the recorder report.
4. Create a poster displaying how refractory can play a role in this process. Think about how the heat flows in this process, what are the potential dangers of not having that refractory in place (potentially to the steel kiln or furnace). The spokespersons will have an opportunity to share this poster to the rest of the class.
5. Suppose you were an engineer at a plant that performs the process you have been discussing. If you were instructed to design and plan out the construction of this heater, refractory, kiln or furnace layout, what are key points that you would make to the plant manager to approve the funding of refractory for the system? (some cost analysis information: refractory costs ~$150-500 (depends on type of refractory used) / metric ton, cost of steel ~$800-850 / metric ton; life span of refractory varies from 1 to 10 years depending on the type of refractory, with average lifespan of 5 years, life span of a well-kept kiln or furnace ~30 years). These numbers are just some crude reference numbers, but use sound scientific reasoning to help explain why the purchase of refractory would be important for your process.

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