1. **CO2 from Humanity**: Make an estimate of how much CO2 all of humanity exhales in a year in metric tones. How does this compare with the total for anthropogenic emissions?

2. What temperature (K) is required to use carbon-to-carbon monoxide reduction to reduce Zinc oxide to Zinc?

3. Do an exergy analysis of the reaction $2\text{Cu}_2\text{S} + 3\text{CO}_2(\text{g}) \rightarrow 2\text{Cu}_2\text{O} + 2\text{SO}_2$, an important reaction in copper smelting.

4. In our discussion of “The Mobilization of Materials by Human and Natural Activities”, we mentioned that volcanism isn’t considered by Klee and Graedel. How does it compare to other natural mobilization?

5. Currently the world produces about 100 Mt of NH$_3$ fertilizer. According to Smil, the energy requirements are about 40 GJ/t NH$_3$. How does this compare with the minimum work required to make NH$_3$ (i.e. exergy)?

6. Imagine we want to make hydrogen (H$_2$) for fuel. How do the electrolysis of water and the steam reforming of methane compare? (The reactions in consideration are $\text{H}_2\text{O} \rightarrow \text{H}_2 +1/2\text{O}_2$ and $\text{CH}_4+\text{H}_2\text{O} \rightarrow 4\text{H}_2 + \text{CO}_2$) Why does the second reaction appear more favorable? What is the trade-off?