

## 5.6 May 11, 2006: Miscellaneous

Random topics...

**Recyclability and entropy** Recyclability example: aluminum, takes energy to extract, just melt and recycle, right? But suppose it's an aluminum film on a polymer, like a potato chip bag. Then you're in trouble, can't just melt it, it will oxidize with the plastic.

So entropy is important too. Reflected in the difficulty of separating materials. Other examples: copper in steel, magnesium and other elements in aluminum. Gooseberry's vs. Anna's Taqueria packaging...

Concept: "exergy" defined as free energy relative to ambient chemical potentials, can be thought of as useful energy. "There cannot be an 'energy crisis', as energy is always conserved. (This is the essence of the first law of thermodynamics.) However exergy is a scarce resource which we are depleting daily." Burning fossil fuels does not reduce energy of system, but does reduce available energy (in fact, greenhouse gases increase energy on earth).

The original paper: Keenan, J.H. "Availability and Irreversibility in Thermodynamics." *Br. J. Appl. Phys.*; 1951; 2.

### Questions on the future of 3.044

- What new materials or experiences would be helpful for learning about the processes discussed here? Labs, computation applets, etc.?
- This class has been part analysis/modeling and part process description. Would you say the balance between these has been appropriate, or should there have been more of one or the other?
- How could this course be better tied to 3.042?