ANNEX 5

CAPÍTOL 11. AVALUACIÓ DE COMPETÈNCIES EN UNA CLASSE DE TERMODINÀMICA

Textos per a l'activitat d'aprenentatge: Treball sobre analogies

Entropy: Conceptual disorder (J. Chem. Educ. 1988 65 403-406)

S: My freshman text describes entropy as a measure of randomness, or disorder, in a system. That seems clear enough. It gives examples of spontaneous processes that involve increasing disorder – like a gas expanding into vacuum, or my room getting messy, or rivers getting polluted. But now we are solving problems where entropy changes don't seem to go along with this picture.

P: What sort of problems are you thinking of?

S: Well, suppose we have a mole of neon gas in a 20-liter container at 300 K and we heat it at constant volume to 400 K. The entropy of the gas increases, right?

P: That's right.

S: But it seems to me that the positions of the atoms are just as random at 300 K than at 400 K. I mean, aren't they completely random distributed in both cases?

P: You are absolutely right! What are you seeing here is a limitation in the definition of entropy as it appears in your freshman text. There is really more to entropy than positional disorder or randomness, and the heating of neon at constant volume is an excellent example.

S: Is the freshman-text explanation wrong, then?

P: Well, it's certainly incomplete. Oversimplified to the point of being misleading, I would say. In many cases, though, it leads to the correct prediction.

A study of Turkish chemistry undergraduates' understanding of entropy

(J. Chem. Educ. 2007 84 1204-1208)

P: Can you tell me what you knew about entropy when you first came to this class?

S: I only knew that the word means disorder ...

P: Can you tell me what do you mean by disorder? Do you remember what changes the entropy of a substance?

S: Temperature changes...

P: Can you tell me a little bit about how temperature changes entropy?

S: For example, temperature increases the velocity of molecules. Once the velocity increases, movements increase. I mean, increase of entropy is the result of increase of disorder by collisions of gas molecules. For instance think about when students sit in a class and when students start moving around in the class. In this case entropy increases because disorder increases. Think about a class having 50 students in. We put another student into this class, and all of them moving around. There will be a big disorder, but if all of them sit, there will be order. Disorder can be explained like this. I mean disorder is the random movement of molecules.

Pàgines web per a l'activitat d'aprenentatge: joc de Boltzmann

http://www.stolaf.edu/depts/chemistry/imt/pc

http://www.stolaf.edu/depts/chemistry/imt/concept

http://www.stolaf.edu/depts/chemistry/imt/js