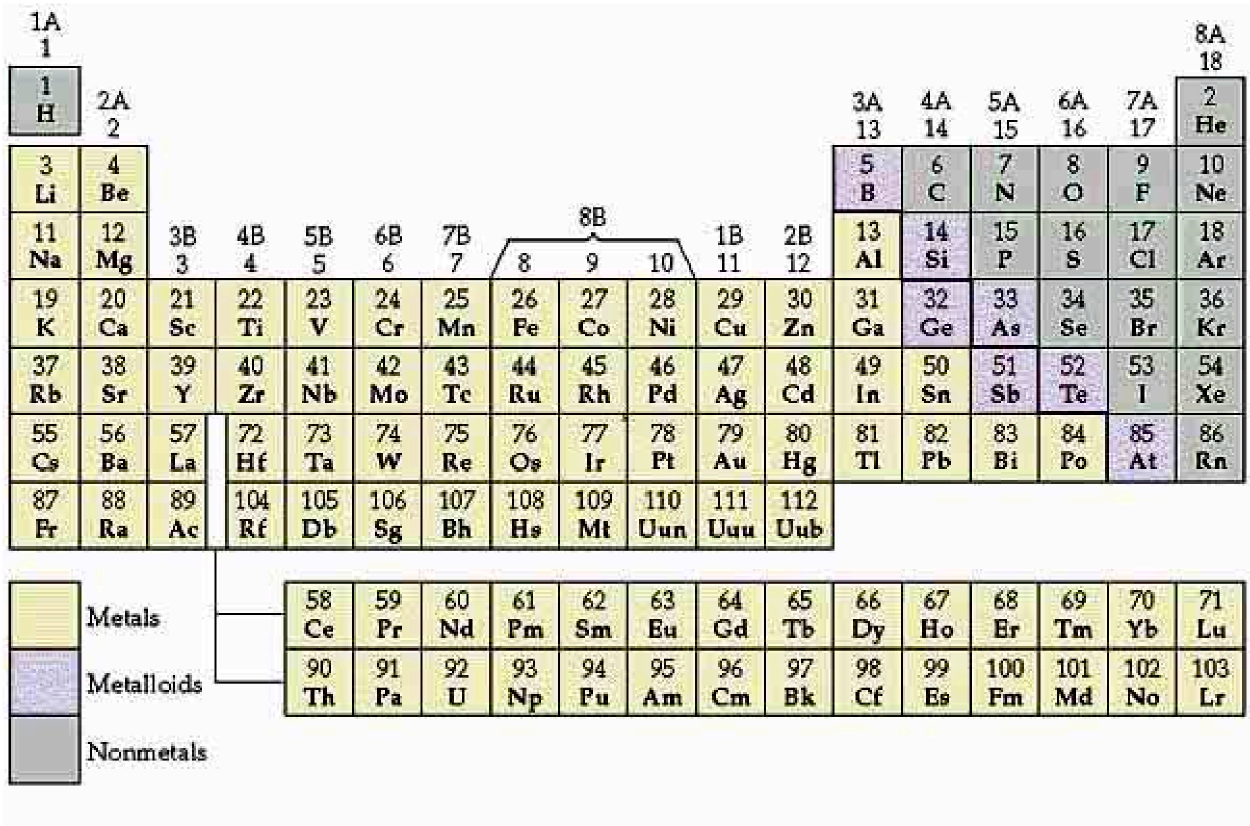
Practice General Chemistry SPEAK Test #9

(by Robin Hekker)



1. A student is working on an in-class assignment and is having trouble finding selenium on the large periodic table hanging on the wall. The student knows that the atomic number for Se is 34, but the table on the wall is old and the numbers are illegible. Suggest how he might be able to find selenium in the Table by counting from H. (30 seconds).

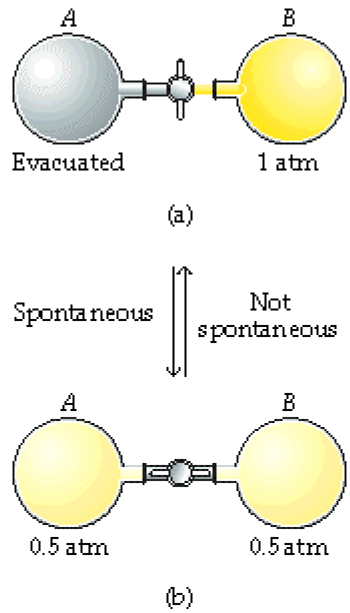
2. Select the 10 elements in the periodic table that are most difficult for you to pronounce each one in turn (30 seconds).

3. The textbook describes four properties of matter: physical, chemical, intensive, extensive. Briefly explain how the physical properties of the elements vary across the periodic table. (60 seconds).

4. One of the first topics usually introduced about thermodynamics is spontaneous processes. What does it mean when a process is spontaneous? Also, note: are all spontaneous processes also exothermic? Give your students at least three examples. Be creative☺. (60 seconds)

5. Express the first law of thermodynamics mathematically and define what each of the symbols mean (30 seconds).

Here is figure 19.4 in your textbook (Page 718).



6. Using the idea that the expansion of an ideal gas into an evacuate space is spontaneous, explain to your students why one route is spontaneous and other is not. (45 seconds)

7. Summarize the various molecular degrees of freedom that should be considered in a molecular interpretation of entropy. (60 seconds)

Many students have difficulties performing simple calculations in General Chemistry. I'd like to hear how you would help them with these kinds of problems.

8. In a laboratory assignment, a student is required to use significant figures to indicate the exactness of a measurement. For example, Bobby made the following calculations:

a. (6.221 cm)(5.2 cm) = 32.3492 cm
b. 20.4 cm + 1.322 cm + 83 cm = 104.722 cm

He reported his answers as 32.4 cm and 110, which are incorrect since he has confused the significant figure rules for multiplication/division with subtraction/addition. Explain the rules of significant figures to Bobby. (60 seconds)

9. In Appendix C in the textbook there are summarized various thermodynamic textbooks with already calculated values of ΔS.

Describe to a student how to use this data to solve a problem related to changes in molecular entropy. Do not worry about the quantitative aspects, just walk the student through the problem.

1. Start by briefly explaining the following equation and show how to determine m and n.

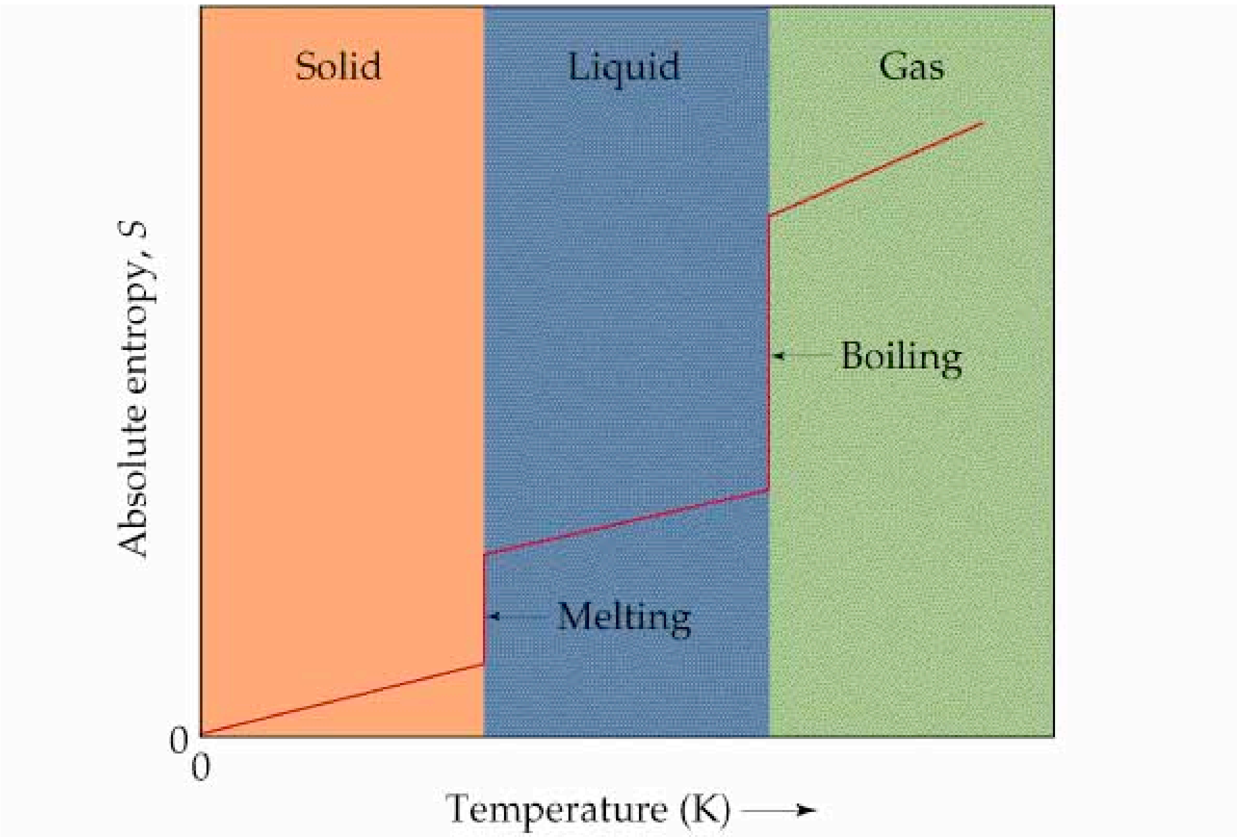
$$\Delta S^0 \;=\; \Sigma\, nS^0(\text{products}) \;-\; \Sigma\, mS^0(\text{reactants})$$

2. Describe how ΔS for the synthesis of ammonia from $N_2(g)$ and $H_2(g)$ at 298 K can be calculated, using the equation above and using the data in Appendix C.

$$N_2(g) + 3\,H_2(g) \rightarrow 2NH_3(g)$$

(60 seconds)

10. The graph below illustrates how entropy changes in a crystalline solid with increasing temperature. Using this diagram, explain how entropy changes as block of ice changes into a gas. (60 seconds)



11. Describe the changes in entropy that would occur as water vapor is gradually cooled to absolute zero. (45 seconds)

12. Dr. Gould teaches CHM 331. He's made some changes to the class schedule by adding some review sessions, changing a few dates, and changing the topics covered in one of the exams. Please announce these changes to your students.

Exam/Problem Set Schedule, Tentative Lecture Schedule

Dates	Lectures	Topics
Aug 22 - Sept 12	1 - 9	Bonding and Structure
(Sept 5 No Class, Labor Day) **Review Session will be hosted at 2:00 pm**		
Sept 14 - Sept 19	10 - 12	Alkanes
Sept 19 Problem Set #1 Available on the Web Site		
Sept 21 - ~~Oct 3~~ **October 5**	13 - 17	Organic Spectroscopy
Sept 26 Midterm Exam #1: Emphasis on Sections A , B, **and lecture 13 and 14 from C**		
Oct 5 - Oct 12	18 - 21	Organic Reactions
Oct 10 Problem Set #2 Available on the Web Site		
Oct 14 - Oct 26	22 - 26	Alkenes I
Oct 17 Midterm Exam #2: Emphasis on Sections C and D, **Expect bonus questions from section E**		
Oct 28 - Nov 4	27 - 30	Stereochemistry
Oct 28 Course Withdrawal Deadline (in person)		
Nov 7 - Nov 21	31 – ~~35~~ **34**	Alkyl Halides
~~Nov 7~~ Problem Set #3 Available on the Web Site **November 5**		
Nov 14 Midterm Exam #3: Emphasis on Sections E and F		
Nov 23 - Dec 5	36 - 40	Alkenes II
(Nov 25 No Class, Thanksgiving) **Review session will be hosted November 26 at 5:30 pm**		
Dec 5 Problem set #4 ~~Available on the Web Site~~ **Copies will be available in lecture**		
Dec 12 Final Exam ~~(10:00 - 11:50 AM)~~ **(12:20 to 2:10)**		