

Think It Over



This section of Resonance is meant to raise thought-provoking, interesting, or just plain brain-teasing questions every month, and discuss answers a few months later. Readers are welcome to send in suggestions for such questions, solutions to questions already posed, comments on the solutions discussed in the journal, etc. to Resonance, Indian Academy of Sciences, Bangalore 560 080, with "Think It Over" written on the cover or card to help us sort the correspondence. Due to limitations of space, it may not be possible to use all the material received. However, the coordinators of this section (currently A Sitaram and R Nityananda) will try and select items which best illustrate various ideas and concepts, for inclusion in this section.

1. Barometer Problem

Consider a mercury barometer made in the usual way with a glass tube sealed at one end but with the tube held up by a spring balance. Will the downward pull on the balance be just the weight of the tube, or will it be the combined weight of the tube and the column of mercury? There will be, of course, a slight correction for the buoyancy of that part of the glass tube which is immersed in the mercury reservoir at the bottom but neglect this. It would seem that one must support just the weight of the glass for have we not been taught that the mercury is held up by the pressure of the atmosphere? Besides if we lift the glass tube up a bit we do not lift the mercury higher.

From: *Selected Popular Writings of E U Condon - Springer Verlag, 1991.*

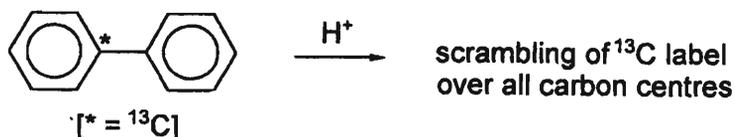


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2. Some Questions Concerning Isotopes

In the four part series on 'Use of Isotopes for Studying Reaction Mechanisms' we described various applications of isotopes. The following questions are related to the topics covered in the series.

1. Propose a reasonable mechanism for the following observation:



2. Is there any difference in the dielectric constants of H_2O and D_2O ?

3. In the second and the third parts of the series a number of examples were provided in which isotopic substitution on a substrate influenced the rate of the reaction. Can isotopic substitution on the *solvent* alter the rate of a reaction?

4. It is well known that natural diamond is the hardest substance. Would diamond completely made of ^{13}C be a harder material?



Science, like life feeds on its own decay. New facts burst old rules: then newly divined conceptions bind old and new together into reconciling law.

William James