

Problem 31, Chemistry 301X - 2006

In Problem 28, we looked at the reaction of the hydronium ion,  $\text{H}_3\text{O}^+$ , with 2,3-dimethyl-2-butene. Some of you wondered why the hydronium ion was necessary - why not just use water.

- (a) What is the hydronium ion anyway? Draw a perfect Lewis "dot" structure for  $\text{H}_3\text{O}^+$ .
- (b) Write a mechanism for the reaction of isobutene with the hydronium ion to give only *tert*-butyl alcohol. Make sure you have every step perfect. Bonus: you can now explain why only a catalytic amount of hydronium ion is necessary for this reaction.
- (c) Why does the reaction fail utterly when water is used, when there is no hydronium ion present? Remember: water does **not** ionize to  $\text{H}^+$  and  $\text{OH}^-$ .