This communication (*J. Am. Chem. Soc.* **2011**, *133*, 9278) describes a yttrium catalyst used for the polymerization of L-lactide.

1. This paper examines catalysts for the ring-opening polymerization of L-lactide. Find (this may require a book or internet search) the structures of L-lactide and the resulting ring-opening polymer.
2. In the column on the right of the first page of this communication, Eq. 1 presents the catalysts examined in this study. In particular, focus on compound **1-M(OR)** where M = Y and R = tBu. There are two metal atoms in this compound, yttrium and iron. Classify, determine the electron count, ligand bond number, valence and the dn count for each of the metal centers.
3. Looking at Figure 3, what are the labels and units for the x- and y-axes?
4. Briefly describe what the y-axis is telling you about? Information from the figure caption will help provide important contextual details.
5. Describe what is happening in the reaction during the first four data points.
6. From the graph, what is added to the reaction at the fourth data point?
7. The authors used common abbreviations to represent the compound added at the fourth data point. A more complete representation of FcBArF would be [(η5-C5H5)2Fe][B(3,5-C6H3(CF3)2)4]. Classify the organometallic cation, [(η5-C5H5)2Fe]+, and determine the electron count, ligand bond number, valence on iron and the dn count for iron. You should expect to come up with an unusual electron count for this species.
8. Iron is the ‘poster child’ for the 18-electron rule (see the iron electron count distribution <http://www.columbia.edu/cu/chemistry/groups/parkin/mlxz.htm>). Based on your electron count for question 5, suggest possible reactions the FcBArF could be undergoing in the reaction mixture. Don’t focus on what the FcBArF might be reacting with, but rather what could be happening to the FcBArF. If you are uncertain, the figure caption provides a hint.
9. At the sixth data point the authors add a different compound, CoCp2, to the reaction. Classify CoCp2, and determine the electron count, ligand bond number, valence on cobalt and the dn count for cobalt. You should also expect to come up with an unusual electron count for this species.
10. Cobalt also follows the 18-electron rule well (see the cobalt electron count distribution <http://www.columbia.edu/cu/chemistry/groups/parkin/mlxz.htm>). Based on your electron count for question 7, suggest possible reactions the CoCp2 could be undergoing in the reaction mixture. Don’t focus on what the CoCp2 might be reacting with, but rather what could be happening to the CoCp2. If you are uncertain, the figure caption provides a hint.
11. Describe what is happening during the time period between the fourth and sixth data points. In particular, focus on the y-axis of the plot. What conclusion(s) can you draw from this?
12. What is happening after the sixth data point, again focusing on how the y-values are changing versus time. What conclusion(s) can you draw from this?
13. The first four data points appear to define a line. The sixth through ninth data points are also approximately linear with a slope similar to that of the line defined by the first four data points. At longer times there is significant curvature in the data. Account for this curvature in the data.
14. Figure 2 shows the XANES spectra for ferrocene, FcBArF, [1-Y(OtBu] and [1-Y(OtBu)][BArF]. What is XANES? In relation to this paper, what is significant about the data that is presented in Figure 2?
15. The XANES data is conclusive evidence for the oxidation occurring at the iron center. How might you argue that the oxidation must be iron-centered based exclusively on your answers in question 2?
16. The title of this paper is “Redox Control of a Ring-Opening Polymerization Catalyst”. Based on your answers to the previous questions, how can you rationalize this title?