Vol 3 (2), July 2012; 18-20

Teaching Undergraduates Students through Connectivity: Part 3

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ABSTRACT

Teaching in a classroom becomes pointless, if it is unable to induce creativity among students. The scenario for teaching and learning methods is changing at a fast pace to ensure quality education. Connectivity approach for teaching and learning is one of such steps that concept building exercise becomes easier for teachers and helps students to assimilate ideas, normally considered to be difficult. In this model lesson, we have tried to build an understanding of various applications of Grignard reagent in synthetic organic chemistry.

Keywords: Teaching, Students, Chemistry, Connectivity, Grignard reagent.

INTRODUCTION

Means for decimation of knowledge in present time has become as important as knowledge itself. A lot of literature on any academic task has been available to the students from very beginning to the higher level but it lacks ability to get ingrained in students minds. In order to provide an in depth understanding of scientific knowledge the method of teaching is the key. Chemistry is a vast field and highly interlinked to different scientific disciplines. Therefore it is vital that young minds could be made to grasp the subject matter in a way that they take the knowledge as a whole which is well connected to the problems of the modern day world. Connectivity approach for teaching and learning is a method to provide in depth and whole some knowledge of subject to the students and teachers and enables the students to gel together thoughts and ideas gathered from a variety of different disciplines together. The method provides a platform to correlate different phenomena and thus enhances quantum of participation in learning process. In organic chemistry, reactions of organic reagents are very important as they road maps for many industrial processes that produce products for human welfare.

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Hydrocarbons are freely available in nature and are the raw material for many products of basic needs. Grignard reagent is a blessing for synthesizing many hydrocarbon derivatives. It is used to convert respective raw materials to desire products. The synthetic path for the other product of these materials can also be identified.

Instead of learning and memorizing Grignard reagent based reactions for synthesizing reaction specific functional groups containing compound, One can adopt a connectivity way to develop methods and routes for producing a product which is feasible in terms of economy, health care and for a friendly environment.

We suggest the some concept map, which would enhance the understanding of students for different applications Grignard reagent in synthetic organic chemistry. Out of many synthetic applications of Grignard reagent we bring fore the synthesis of the following organic products.

1. Aldehyde
2. Alcohols
3. Ketone
4. Carboxylic acid

5. Alkane
6. Alkene

Essential information needed to explain the application of Grignard reagent for the synthesis of organic compounds outlined above, are highlighted through diagram shown in figure 1

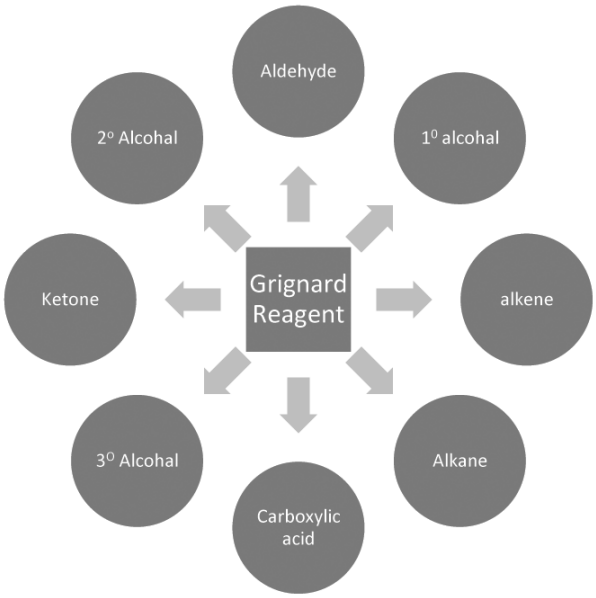

Figure 1 : Illustration of linear connection

Now, this linear relationship diagram can be rearranged to develop a connectivity figure 2, which demonstrates the individual relationship of the product formed through Grignard reagent are also connected such as 1o alcohol is connected to aldehyde and the aldehyde is connected to 20 alcohol which is then connected to 30 alcohol, so this diagram produce a web like connection, that predict the synthetic route for producing almost every functional group bearing compound. Like converting alcohols to aldehyde and ketone, ketones to carboxylic acid, alkane and alkene to alkyl halide and alkyl halides to alcohol. In order to initiate and develop connectivity abilities in mind, the connectivity diagram figure 2 is drawn which gives the idea of interconnection in preparing various derivatives through Grignard reagent.

From the diagram in figure 2, one can notice that there are two types of connections, these are ones which have been explained by the teachers and hence understood by the learner are marked as (v) sign, while the other having double headed arrow and question marks (?) on them need to be investigated, discussed and appropriate synthetic routes can be developed.

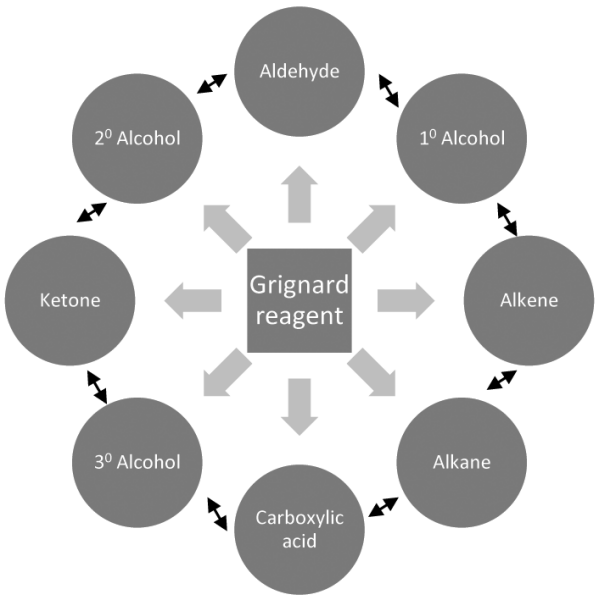

Figure 2

As step by step different connections are explored the connectivity diagram begins to develop and opens new avenues for synthetic creativity get opened up. Figure 2 enables us to interpret and design steps towards a successful synthesis of a desired organic compound through Grignard reagent.

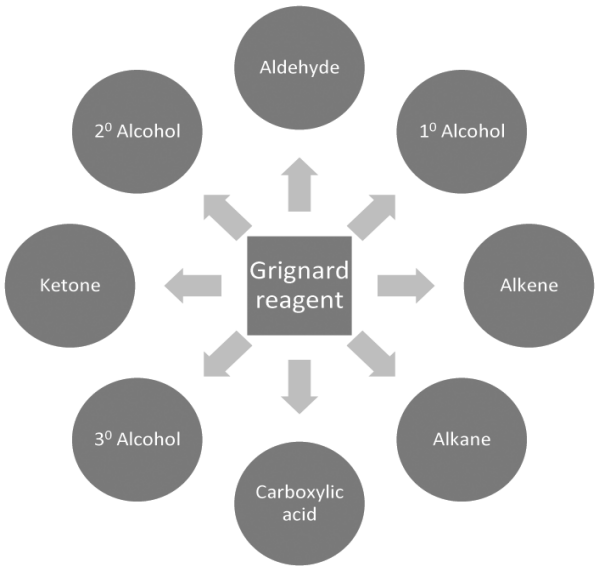

Figure 3

At the stage of designing figure 3, new ideas and connection begin to arise in the mind, which opens the door of new approach towards organic synthesis. For instance when the connection of 10 Alcohol with aldehyde is drawn, at the same time one can think does this aldehyde could be connected to 20 Alcohol and when connection is approached, a new door to think this 20 Alcohol to hydrocarbon (alkane, alkene) opens. This connectivity approach builds up a potential for creating

SUMMARY

A new road map for a lecture of or "reactions of Grignard reagent" has been demonstrated through connectivity approach. This lecture provides a better understanding of the reactions and correlations of the product also. This teaching technique opens the door for visualizing newer connection for development of suggesting new economical roots for synthesizing the same products.

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