Concept Mapping: Connecting Educators
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HOW TO FORM AND TRANSFORM POLYMERS

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Abstract. The rapid advances in the theoretical understanding of organic reactions and the technological development of research instruments necessitate not only continual examination and revision of the organic chemistry theory and laboratory curriculum but also look for learning tools, thus encouraging students to use meaningful mode learning patterns. We select concept maps as a powerful tool to organize the concepts presented in an Introductory Organic Chemistry Course. Many students are not familiar with concept map, so the teachers presented, at the beginning of the course, general information about their construction and use. At the end of the course it is expected that, by using concept maps, the knowledge that the students acquired is retained, as opposed to that acquired through traditional rote learning techniques.

1 Introduction

In an Introductory Organic Chemistry Course where traditional teaching techniques are used, the students are presented with course contents as a list of topics that they need to study through out the course. Looking to improve the learning process, we selected concept mapping as an alternative tool to promote learning.

2 Discussion

Many students are not familiar with concept maps, so at the beginning of the course (march, 2008), the professors gave a presentation on general information about them and their use and construction.

We needed a session to explain the general theory underlying concept maps, and the difference between rote learning and meaningful learning. After that, we presented an initial list of organic chemistry concepts (parking lot of concepts) included in the course, and began working with a few of them to build a preliminary map.

Among the list of concepts we chose, was a very general one: **"Polymer":** The selection was made because students use polymers in daily life in form of containers (PET), fibres (nylon) or food (starch, meat) so, they have information and prior knowledge about them.

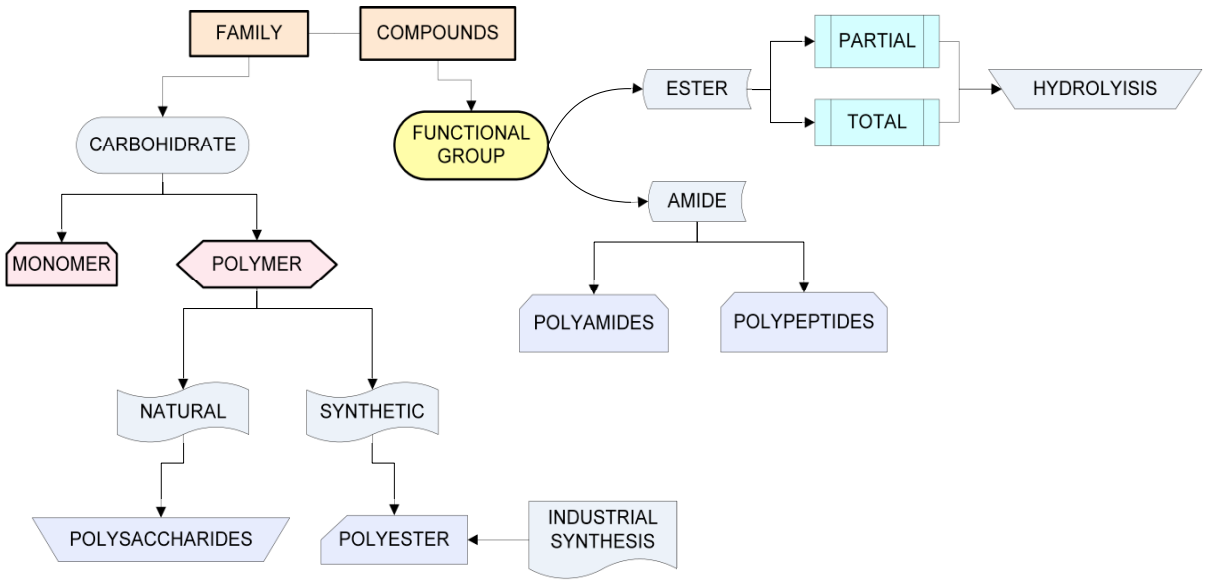
The course is theoretical and experimental, so the acquisition of knowledge is mediated with concrete experiments and hand on activities. In the classroom we presented the material to be learned with examples relatable to the learners prior knowledge and the topics that are studding in the related courses. After some working sessions we defined the context for the Concept Map. We selected as Focus Question "**How to form and transform Polymers?**" to specify the problem the concept map should help them to solve. At the end of the course, we hope that each student will have created his or her own concept map for the concepts studied during the course.

The concepts analysed through the course are:

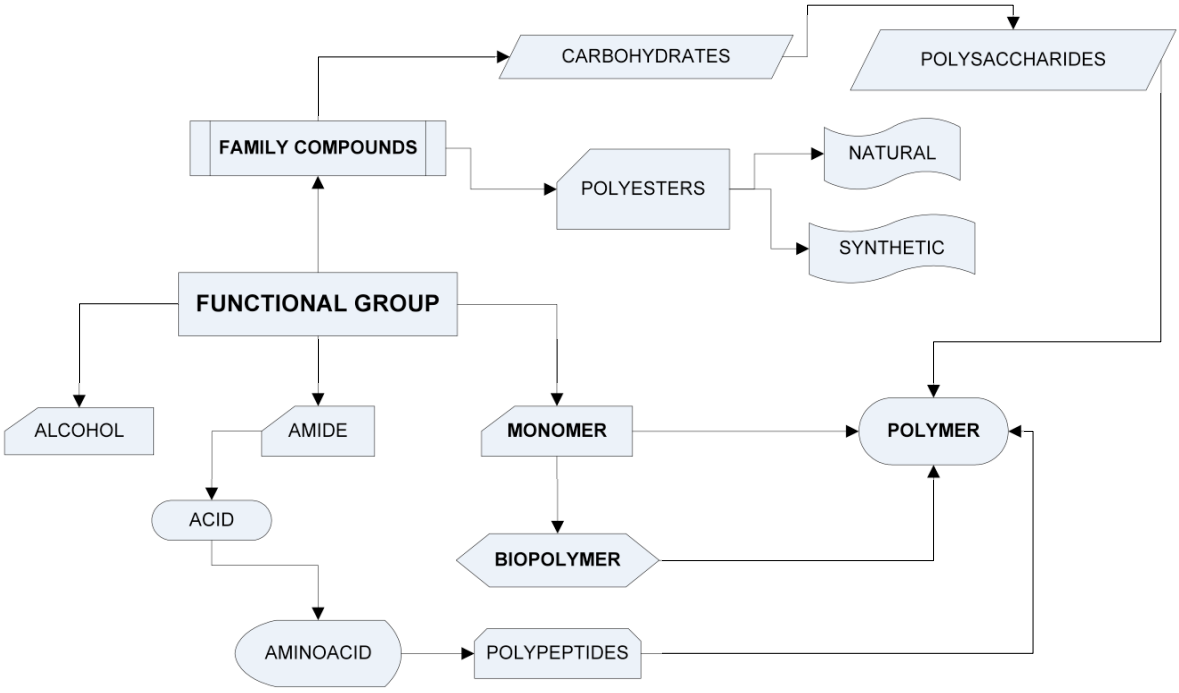
1. Acid.
2. Amine.
3. Amide
4. Amino acid.
5. Alcohol
6. Biopolymer
7. Carbohydrate
8. Condensation
9. Functional group.
10. Family compounds
11. Industrial synthesis
12. Partial hydrolysis.
13. Total hydrolysis
14. Monomer
15. Natural

16. Polymer
17. Polyamides
18. Polyesters
19. Polypeptide
20. Polysaccharides
21. Research Synthetic

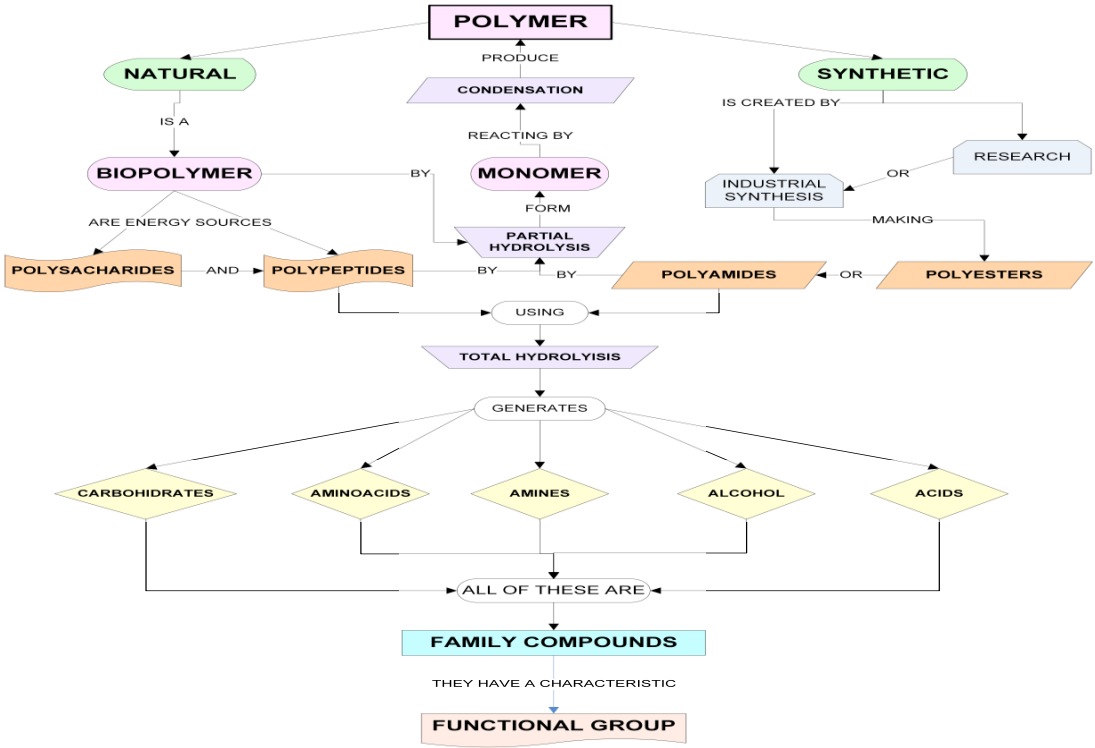
We present 4 examples of concept maps made by the students during the Organic Chemistry course. We chose these maps because they represent the evolution of their knowledge throughout this course. The first one was made at the beginning of the course, with some of the concepts that were selected by the students according to their prior knowledge. The following maps (2nd, 3rd, 4th) were made with all the concepts **(parking lot concepts)** and were focused answering de **Focus Question "How to form and transform polymers?"** throughout the course. The course was divided into 4 stages, at the end of each one a map was constructed.



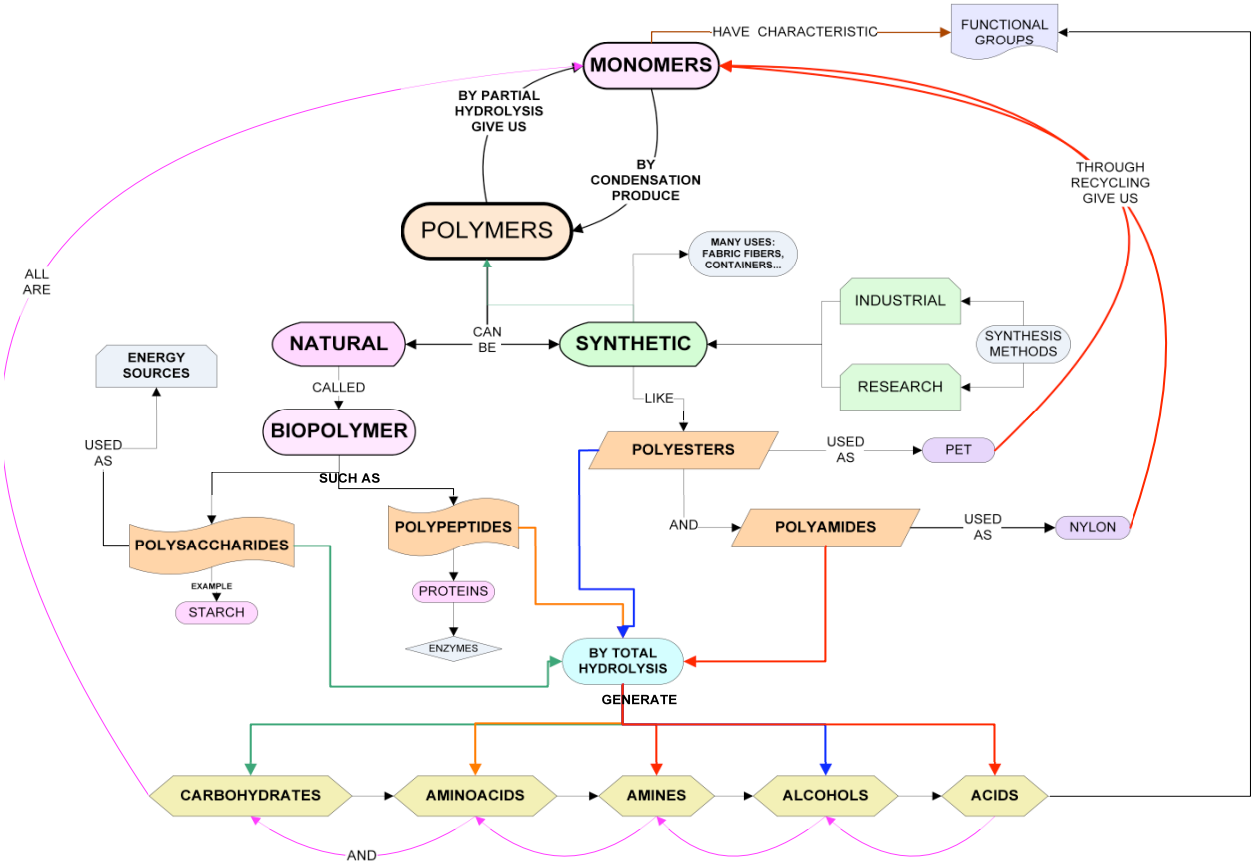
1st STAGE: "How to Form and Transform Polymers?"



2nd STAGE: “How to Form and Transform Polymers?”



3rd STAGE: “How to Form and Transform Polymers?”



4th STAGE: "How to Form and Transform Polymers?"

3 Conclusions

As the evaluation of the group continued, according to the topic "How to form and transform polymers?" we noticed that the group of students that used concept maps as a study technic had a higher performance than those who used the traditional tools of study.

We expect students will obtain more meaningful learning through the use of concept maps and will have learned how to use these maps in the creation of new knowledge in their studies in general and in any situation in their lives.

4 References

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