

A Guide to Organic Reactions

Teaching Approach

In this series of videos we identify/link the structure of organic molecules to their ability to react to make new molecules. The series follows a logical path from addition of unsaturated molecules, elimination (including cracking) from saturated molecules and also substitution reactions (including esterification). A specially written episode is added in Lesson 4 where attention is given to condensation polymers as well as addition polymers.

Learners should ideally watch the videos in the correct order, followed by the task video. The order has been chosen to make the most sense and introduce the concepts slowly.

Organic chemistry is a highly visual section of chemistry and is an excellent chance to help give those that have little confidence in chemistry an easier way to improve. Organic chemistry does not rely on many of the foundational concepts that other sections do, and thus might be an important step to improve the chemistry marks of less confident chemistry learners.

It's very important to emphasize that organic reactions are the more difficult section of matter and materials and requires practice on the learner's part. Make sure that the learners actively draw the molecules in the tasks and not merely watch the videos. Where possible, name all the molecules in the reactions to emphasize and reinforce IUPAC naming principles.

It is very important that learners are able to identify the type of reactions occurring on a page, some of the clues to watch out for in this section are:

- The number of reactants
- The type (saturated or unsaturated) of reactants
- The number of products
- The type of products (saturated or unsaturated)
- The reaction conditions used to allow the reaction to occur

You may notice that the use of halogens to test for unsaturated compounds is a quick and easy test for unsaturated compounds and is a likely candidate for examination purposes.

Some of the more difficult concepts like asymmetric addition (Markonivkov's rule) and elimination (Zaitsev's rule) will require patience and great care to ensure that learners understand. Make sure that the foundations of elimination and addition are in place before you do those parts of the video lessons.

In summary, make sure that the learners are exposed to and draw as many reactions as possible. They should be able to predict products. They must also be able to name reaction types and, identify conditions for reactions and work back to reactants that produced a product shown.

Video Summaries

Some videos have a 'PAUSE' moment, at which point the teacher or learner can choose to pause the video and try to answer the question posed or calculate the answer to the problem under discussion. Once the video starts again, the answer to the question or the right answer to the calculation is given

Mindset suggests a number of ways to use the video lessons. These include:

- Watch or show a lesson as an introduction to a lesson
- Watch or show a lesson after a lesson, as a summary or as a way of adding in some interesting real-life applications or practical aspects
- Design a worksheet or set of questions about one video lesson. Then ask learners to watch a video related to the lesson and to complete the worksheet or questions, either in groups or individually
- Worksheets and questions based on video lessons can be used as short assessments or exercises
- Ask learners to watch a particular video lesson for homework (in the school library or on the website, depending on how the material is available) as preparation for the next day's lesson; if desired, learners can be given specific questions to answer in preparation for the next day's lesson

1. Addition Reactions

In this video, the general reaction scheme is shown that unsaturated molecules can add hydrogen, halogens, hydrohalogens and water. Markonikov's rule is shown where we find two different products.

2. Elimination Reactions

In this lesson we focus on elimination reactions of saturated molecules. Learners are shown the conditions and types of elimination to produce hydrohalogens, water and a special mention is given to the industrial process cracking.

3. Substitution Reactions

In this lesson, reactions between alkanes, alcohols and haloalkanes are shown as substitution reactions. The lesson also covers the formation of esters and the UV initiated reaction between alkanes and halogens.

4. Macromolecules: Polymer Reactions

In this lesson, attention is paid to the formation of polymers. Addition polymerisation of ethene and the formation of polylactic acid are discussed and shown in great detail. Also discussed are the terms monomer and polymer.

Resource Material

Resource materials are a list of links available to teachers and learners to enhance their experience of the subject matter. They are not necessarily CAPS aligned and need to be used with discretion.

Organic Molecules The preceding lessons on Organic Molecules in Matter and Materials for Grade 12 are useful revision before starting these lessons	http://www.chemguide.co.uk/basicorg/conventions/names.html	A good approach with steps on how to name organic compounds.
	http://en.wikipedia.org/wiki/IUPAC_nomenclature_of_organic_chemistry	Basic nomenclature. Many other functional groups.
1. Addition Reactions	http://en.wikipedia.org/wiki/Addition_reaction	Addition polymerisation
	http://chemwiki.ucdavis.edu/Organic_Chemistry/Polymers/Addition_Polymers	Includes a video
2. Elimination Reactions	http://en.wikipedia.org/wiki/Elimination_reaction	Cracking reaction video
	http://www.youtube.com/watch?v=7M7RY04KKBs	Also a Wikipedia resource
	http://en.wikipedia.org/wiki/Cracking_%28chemistry%29	An encyclopedia on cracking which is the process whereby complex organic molecules are broken down into simpler molecules.
3. Substitution Reactions	http://en.wikipedia.org/wiki/Substitution_reaction	A resource on substitution and elimination reactions.
	http://www.khanacademy.org/science/organic-chemistry/substitution-elimination-reactions	Khan academy for more depth
4. Macromolecules: Polymer Reactions	http://www.launc.tased.edu.au/online/sciences/PhysSci/pschem/carbon/poly/Addition.htm	A good introduction with picture of addition polymerisation
	http://www.chemguide.co.uk/organicprops/alkenes/polymerisation.html	This page looks at the polymerisation of alkenes to produce polymers like poly(ethene), poly, PVC and PTFE. It also looks briefly at how the structure of the polymers affects their properties and uses

Task

Question 1

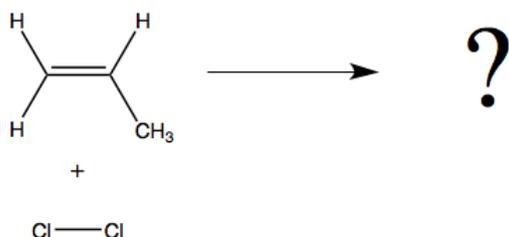
Make a table to summarise the types of molecules each type of reaction needs (saturated or unsaturated), how many reactants are needed for each reaction and how many products are formed.

1) Complete the table

Type of Reaction	Type of Reactant	Type of Product	Number of Reactants	Number of Products
Addition				
Elimination				
Substitution				
Polymerisation				

Question 2

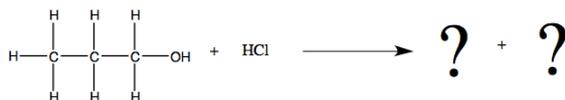
2.1 Draw the product of the reaction below



2.2 Does the reaction in 2.1 need light to happen?

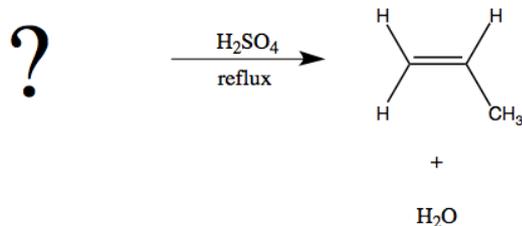
Question 3

Draw and name the products of this reaction below



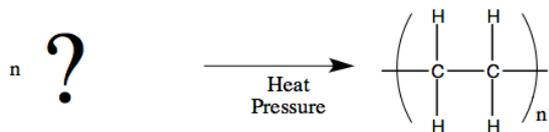
Question 4

Draw the reactant in the reaction below



Question 5

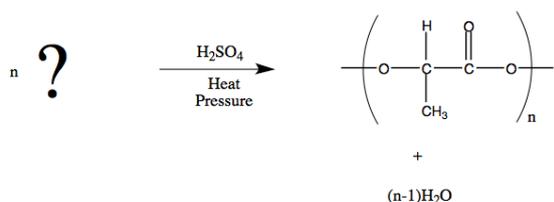
5.1 Draw the monomer shown by the question mark below



5.2 Name the polymer which formed

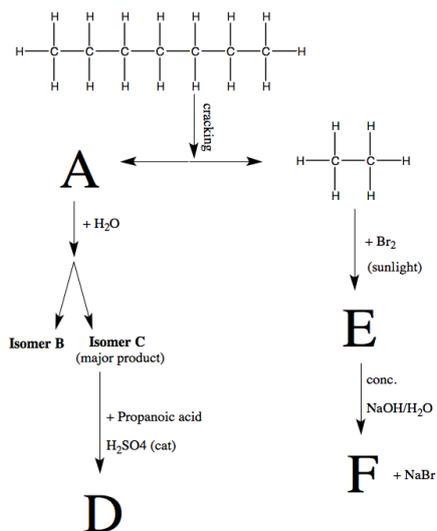
Question 6

Draw the monomer in the reaction below



Question 7

In this flow diagram, you'll have to fill in the molecules represented by letters. It may look scary at first, but if you work through it in the order of the letters, it becomes much easier.



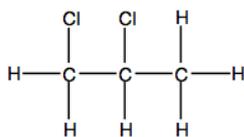
Task Answers

Question 1

Type of Reaction	Type of Reactant	Type of Product	Number of Reactants	Number of Products
Addition	Unsaturated	Saturated	2	1
Elimination	Saturated	Unsaturated	1	2
Substitution	Saturated	Saturated	2	2
Polymerisation	Unsaturated or Polyacid + Polyol	Long chain	Many	1

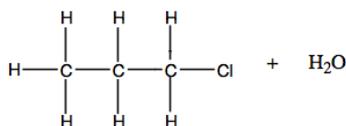
Question 2

2.1



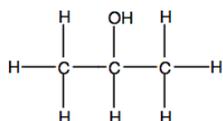
2.2 No, the reaction happens quickly without light OR only substitution with a halogen need light.

Question 3



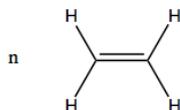
The products are 1-chloropropane and water.

Question 4



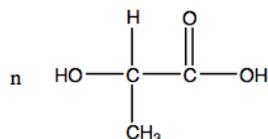
Question 5

5.1



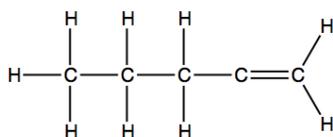
5.2 Polyethene

Question 6

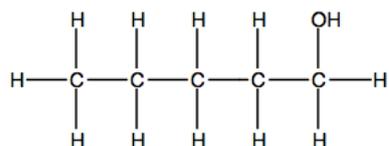


Question 7

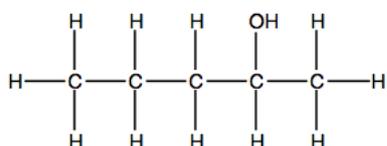
7.1 Molecule A:



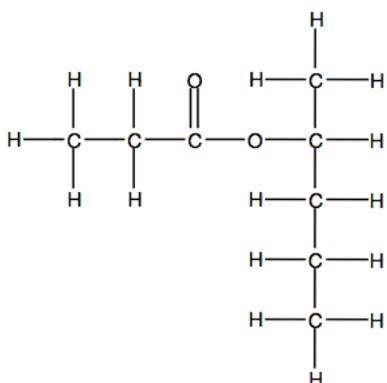
7.2 Isomer B:



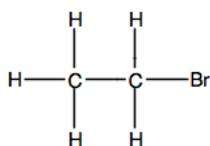
7.3 Isomer C:



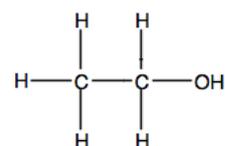
7.4 Molecule D:



7.5 Molecule E:



7.6 Molecule F:



Acknowledgements

Mindset Learn Executive Head	Dylan Busa
Content Manager Classroom Resources	Jenny Lamont
Content Coordinator Classroom Resources	Helen Robertson
Content Administrator	Agness Munthali
Content Developer	Philip Joubert
Content Reviewers	Ross Moore
	Liz Harris

Produced for Mindset Learn by Traffic

Facilities Coordinator	Cezanne Scheepers
Production Manager	Belinda Renney
Director	Alriette Gibbs
Editor	Nonhlanhla Nxumalo
Presenter	Banji Longwe
Studio Crew	Abram Tjale
	James Tselapedi
	Wilson Mthembu
Graphics	Wayne Sanderson

Credits

http://upload.wikimedia.org/wikipedia/commons/2/26/Канцелярские_товары_Erich_Krause.JPG

http://upload.wikimedia.org/wikipedia/commons/2/29/Chinese_plastic_toys1.JPG

http://upload.wikimedia.org/wikipedia/commons/2/2a/Soft_drink_shelf.JPG

http://upload.wikimedia.org/wikipedia/commons/7/75/C-media_manli_soundcard.jpg

http://upload.wikimedia.org/wikipedia/commons/9/92/Waste_cocobeach_india.jpg



This resource is licensed under a [Attribution-Share Alike 2.5 South Africa licence](https://creativecommons.org/licenses/by-sa/2.5/za/).

When using this resource please attribute Mindset as indicated at <http://www.mindset.co.za/creativecommons>