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Atom Economy and Percentage Yield

It's important in industrial reactions that as much of the reactants as possible get turned into useful products. This depends on the atom economy and the percentage yield of the reaction.

"Atom Economy" — % of Reactants Forming Useful Products

1) A lot of reactions make more than one product. Some of the products will be useful, but others will be waste.

2) The atom economy (or atom utilisation) of a reaction tells you how much of the mass of the reactants is wasted when manufacturing a chemical and how much ends up as the desired product. Learn the equation:

$$\text{atom economy} = \frac{\text{relative formula mass of desired product}}{\text{relative formula mass of all reactants}} \times 100$$

3) 100% atom economy means that all the atoms in the reactants have been turned into the desired product. The higher the atom economy the 'greener' the process.

EXAMPLE:

Calculate the atom economy of the following reaction to produce hydrogen gas:



1) Identify the desired product — that's the hydrogen gas.

2) Work out the M_r of all the reactants:

$$\begin{aligned} M_r(\text{CH}_4) &= 12 + (4 \times 1) = 16 \\ M_r(\text{H}_2\text{O}) &= (2 \times 1) + 16 = 18 \\ 16 + 18 &= 34 \end{aligned}$$

3) Work out the total M_r of the desired product:

$$3 \times M_r(\text{H}_2) = 3 \times (2 \times 1) = 6$$

4) Use the formula to calculate the atom economy:

$$\frac{6}{34} \times 100 = 17.6\%$$

So in this reaction, over 80% of the starting materials are wasted.

Condensation polymers gcse worksheet. Condensation polymers worksheet. Condensation polymerisation worksheet. Condensation polymers questions. Condensation polymerisation questions.

Which two compounds are isomers of one another? Representing Organic Compounds The structures of four organic compounds are shown. Which one does not show the displayed formula of the compound? Which of the following is not a feature of a homologous series? Compounds have the same functional group Compounds have the same physical properties Compounds have the same general formula Compounds have similar chemical properties Which of the following reactions is an example of an addition reaction? Methene, ethene, propene, butene Ethene, butene, propene, and pentene Methene, ethene, butene and propene Condensation polymers are formed when two different monomers are linked together with the removal of a small molecule, usually water This is a key difference between condensation polymers and addition polymers: Addition polymerisation forms the polymer molecule only Condensation polymerisation forms the polymer molecule and one water molecule per linkage The monomers have two functional groups present, one on each end The functional groups at the ends of one monomer react with the functional group on the end of the other monomer, in so doing creating long chains of alternating monomers, forming the polymer Polyesters are formed from two different monomers and produce water For every ester linkage formed in condensation polymerisation, one molecule of water is formed from the combination of a -H and an -OH group An example is terylene which is a polyester made from dicarboxylic acid monomers (a carboxylic with a -COOH group at either end) and diols (an alcohol with an -OH group at either end) Each -COOH group reacts with another -OH group on another monomer An ester linkage is formed with the subsequent loss of one water molecule per link The condensation reaction in which the polyester terylene is produced The structure of terylene can be represented by drawing out the polymer using boxes to represent the carbon chains This can be done for all polyesters Diagram showing a section of the polyester terylene Notice that the sequence of bonding in the polyester is the mirror image at either end of the link, NOT the link repetition due to the monomers containing the same functional group at either end. Our customer service team will review your report and will be in touch. Landing A plenary at the end to conclude and summarise the information covered. This quiz includes images that don't have any alt text - please contact your teacher who should be able to help you with an audio description. Quiz: This quiz will test your understanding condensation polymers. Classifying Organic Reactions Page 6 @rocketshets Tes paid licence How can I reuse this? Select overall rating (no rating) Your rating is required to reflect your happiness. Write a review Update existing review It's good to leave some feedback. Something went wrong, please try again later. This resource hasn't been reviewed yet To ensure quality for our reviews, only customers who have purchased this resource can review it Report this resource to let us know if it violates our terms and conditions. are polymers These are manufactured and are called synthetic polymers Nature also produces polymers which are called natural or biological polymers Diagram showing how lots of monomers bond together to form a polymer Addition polymers are formed by the joining up of many monomers and only occurs in monomers that contain C=C bonds One of the bonds in each C=C bond breaks and forms a bond with the adjacent monomer with the polymer being formed containing single bonds only Many polymers can be made by the addition of alkene monomers Others are made from alkene monomers with different atoms attached to the monomer such as chlorine or a hydroxyl group The name of the polymer is deduced by putting the name of the monomer in brackets and adding poly- as the prefix For example if propene is the alkene monomer used, then the name is polypropene Polyethene is formed by the addition polymerisation of ethene monomers Examples of addition polymerisation: polyethene and PVC Deducing the monomer from the polymer Polymer molecules are very large compared with most other molecule Repeat units are used when displaying the formula To draw a repeat unit, change the double bond in the monomer to a single bond in the repeat unit Add a bond to each end of the repeat unit The bonds on either side of the polymer must extend outside the brackets (these are called extension or continuation bonds) A small subscript n is written on the bottom right hand side to indicate a large number of repeat units Add on the rest of the groups in the same order that they surrounded the double bond in the monomer Diagram showing the concept of drawing a repeat unit of a monomer Deducing the polymer from the monomer Identify the repeating unit in the polymer Change the single bond in the repeat unit to a double bond in the monomer Remove the bond from each end of the repeat unit and the subscript n (which can be placed in front of the monomer) Diagram showing the monomer of the repeat unit of polymer Page 3 Which statement is the correct description of a polymer? The atoms within a monomer A large saturated hydrocarbon A large molecule made from many small molecules A large unsaturated molecule Polyesters can be made by condensation polymerisation. Biopolyesters are a specific type of polymers that are synthesised from sugars and plant oils using microorganisms They are able to biodegrade naturally in the environment after their intended purpose The polymers are synthetically made, consisting of ester, amide and ether functional groups which gives them the characteristic of being biodegradable The biodegradation of a bottle made of biopolyesters Page 2 Polymers are large molecules of high relative molecular mass and are made by linking together large numbers of smaller molecules called monomers Each monomer is a repeat unit and is connected to the adjacent units via covalent bonds Polymerisation reactions usually require high pressures and the use of a catalyst Many everyday materials such as resins, plastics, polystyrene cups, nylon etc. What's inside? Ethanedioic acid (a carboxylic acid containing two -COOH groups) to make a polymer. Why do addition polymers not biodegrade easily? Classifying Organic Reactions Page 5 The displayed formulae of an organic compound is shown below. What is the empirical formula of this compound? For example, the short and easy starter exercise introduces students to the topic whereas the 'Main Stage' develops their understanding. This practice sheet covers part of Topic 7 of Chemistry - Organic Chemistry It's designed for GCSE Triple Award Science (separate sciences) It's optimised for the AQA Grade 9-1 Specification 2016 onwards What are the questions like? The four stages imitate a rocket's flight and are: Launch A quick starter or warm up. Whether you're looking for a revision worksheet or a homework task, these Rocket Sheets are perfect! Answers are included with every resource and we ensure each sheet is high quality and accurate. Feel free to contact us via Twitter and we'll be happy to sort out any issues. Save over 75% with the TES Bundle. 1 Revision/worksheet with a variety of different questions 1 Answer sheet with solutions Which content does it cover? Topics include Polymers, Monomers and Reactions with a variety of questions in a PDF format. It will also contain revision questions from previous lessons in this topic. Q6. What is the correct names of the first for alkenes? Unhappy? Rocket worksheets have an optimal layout for a typical classroom lesson. Main Stage The main learning and bulk of the content. Methene, ethene, propene, butene Ethene, propene, butene, and pentene Ethene, butene, propene, and pentene Methene, ethene, butene and propene Page 2 This quiz includes images that don't have any alt text - please contact your teacher who should be able to help you with an audio description. Quiz: This quiz will test your understanding condensation polymers. Polymers can be recycled but it is a difficult and expensive process Addition polymers are unsaturated as they are made by combining molecules which contain a carbon double bond Poly(ethene) is formed by the addition polymerisation of ethene monomers Incinerating polymers contributes to climate change Drawing Polymers Disposal of Addition Polymers Page 4 The displayed formulae of an organic compound is shown below. What is the empirical formula of this compound? Last updated 17 January 2022 A revision homework or class worksheet with answers that covers Condensation Polymerisation in C7 GCSE (Triple) Chemistry. Which of the following is a correct repeat unit for this polymer? They contain ionic bonding They are unsaturated molecules Disposal of Addition Polymers Which of the following statements about polymers is NOT correct? Boost A challenge for those that want to extend their knowledge or find the exercises too easy. The type of questions included in Rocket Sheets: Labelling the diagram True or false statements Gap-fill Complete the sentences Practical questions Explaining methods Challenging questions Multiple choice questions About Rocket Sheets... Rocket Sheets are setup in an ideal layout to build a student's knowledge. Representing Organic Compounds The structures of six hydrocarbons are shown.

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