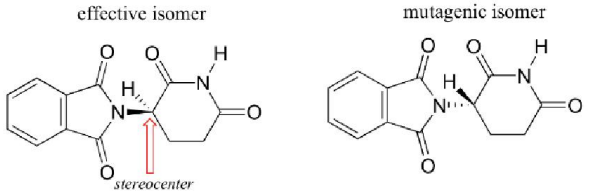
MOLECULAR STRUCTURE CULMINATING ACTIVITY

Characteristics, properties and uses of a substance are closely related to its three-dimensional structure and bonding of its particles. Reactions and properties of organic molecules in particular are highly specific to their structure; small changes in their functional groups or orientations can result in large changes in their ability to perform their required function. For example, the drug thalidomide, used to treat morning sickness in pregnant women in the 1960s has two different orientations around a central carbon. In the wrong orientation, thalidomide causes serious physical birth defects. Tragically, the commercial product contained a mixture of both orientations, resulting in dire consequences. This project is designed to aid in your understanding between the structure and function of a **selected and approved ORGANIC molecule**.



Part 1. The Organic Molecular Model

The materials utilized to build your three-dimensional model must relate directly to your organic molecule. For example, isoprene (2-methyl-1,3-butadiene) is a substance used to make rubber. Rubber is found in products such as tires and rubber bands and can be manufactured using rubber trees. To illustrate both the uses and source of isoprene, toy tires could be used as carbon atoms, rubber bands as bonds, and small rubber trees as hydrogen atoms. Your organic molecule must contain **at least 10 atoms** and have at least **3 different types of atoms**. While constructing your model, try to accurately represent **bond lengths**, **bond angles**, **shapes** and **atom sizes** (the scales used for lengths and sizes will likely be different). Sorry, isoprene and thalidomide are now eliminated as possible choices for this project. Your model **must fit within 1 m^2**, must 'last' for at least one week (i.e. will not spoil, melt, bend, etc. while on display in the classroom) and **food products** are **not permitted** as components of the model. Be careful transporting your model to school because we evaluate the final product (check it when you set up at school).

/20 The three-dimensional model shows the proper three-dimensional structure including number of atoms, arrangement of atoms, number of bonds, type of bonds, bond angles (according to VSEPR geometries and specific angles outlined in course material), bond lengths and atom sizes (based on a different scales and related to course material) and shape around each atom (derived from course material). The model should reflect the overall three-dimensional structural characteristics of your organic molecule (for example, pi bonds, pattern consistency, molecular shape and etcetera). Your model will be based on **predicted chemistry outlined in our course** and thus, may deviate from referenced models.

/5 The choice of materials exhibits creativity (remember these materials must link up to at least **3 different aspects** of the molecule such as uses, sources, etcetera—no, we won't tell you a third aspect—this is for you to determine).

/10 A detailed, well organized (clear and easy to understand) legend is included with the three-dimensional model depicting the name of the molecule, different types of atoms with the scale you used, bond types, bond angles and bond lengths with the scales you used. Include full proper APA citations and references with the legend for researched information.

Part 2. The Organic Molecule Report

Your report must be typed, double spaced no longer than **ONE** page in length. The report must be submitted digitally so it can be analyzed using the Thames Valley District School Board's plagiarism software. A paper copy must also be submitted for marking. It is imperative that you write using your own words and thoughts and use APA citations and an APA reference page for researched work. Spelling, grammar and format will be marked. The marking scheme will be as follows:

/3 Include both a proper scientific name and one other industrial or common name for your organic molecule. Also, identify the family of organic molecules to which your molecule belongs.

/4 Explain one specific method used to chemically prepare your **family of molecules**. Include a **generic chemical reaction** sequence to support your explanation.

/3 Explain one specific **CHEMICAL** function relating to your molecule. For example, you could explain the vital role the molecule plays in a beneficial organic chemical reaction or the key role the molecule plays in a needed chemical process.

/4 Include, within the body of the report, a two or three-dimensional drawing/picture of your organic molecule which should clearly relate to and represent the three-dimensional model you constructed in terms of number of atoms, arrangement of atoms, number of bonds, type of bonds, atom size and shape around each atom **based on your predictions** (as outlined above). Your diagram should include a proper APA figure caption with a citation.

/6 In one paragraph, explain your choices for each material used in your model. A relevant and meaningful reason must be given for each material (remember, you need to represent at least **3** different aspects such as uses, sources, etcetera).

/8 Overall, your **ONE** page report must be concise and follow proper format/organization. Properly written English, spelling and grammar will be marked and the report must be typed in **10-12 point font** and **double spaced**.

/5 All researched information must be cited properly within the report using **APA format**. There must be a separate, **APA formatted** reference page. At least three different sources must be used.

Prepared by A. Jarrett and K. Zuber