

CHEMISTRY Transition tasks for A-Level



Hello to you. I am delighted that you have shown an interest in studying Chemistry A-level at Turton from September.

It is recommended that you begin to do some preparation work for September, and in the absence of formal examinations this summer, successful completion of this transition work may be taken into account as a part of the entry requirements for A-level Chemistry at Turton.

A-level Chemistry is a challenging subject, but you will have more chance of being able to meet these demands if you have a good grasp of the basics from GCSE, and demonstrate a willingness to work hard. These tasks will give you an opportunity to demonstrate that you possess both these qualities.

Each of the tasks can be completed from your own knowledge or research, and should be presented as a word document or powerpoint presentation.

Examples should be used as much as possible to reinforce the points you are making. Each task is worth 10 points, giving a total of 60. See the marking grid on page 3 for how marks will be allocated.

Good starting points for research could be the following:

- BBC Bitesize <https://www.bbc.co.uk/bitesize/examspecs/z8xtmnb>
- My GCSE Science (Turton students will have a login for this) <https://www.my-gcsescience.com/>
- Chemguide (more A-level than GCSE) <https://www.chemguide.co.uk/>

1. Atomic Structure (10 points)

Atoms are the fundamental building blocks in chemistry

- Describe the 3 fundamental particles that atoms are made from, and the properties of each
- What do the atomic and mass numbers tell us?
- Describe what isotopes are, and give examples
- Explain how the electron configuration of an atom gives us information about its position in the periodic table
- Explain how the reactivity of group 1 and group 7 elements depends on the electron configuration

Extension – Show how relative atomic mass is calculated from information about the relative amount of each isotope of an atom. Use a worked example in your answer

2. Bonding (10 points)

The 4 main types of bonding and structure are ionic, simple covalent molecular, macromolecular covalent and metallic

- Explain why some compounds are ionic, but others are covalent
- Research each type of bonding and structure and detail the physical properties typically associated with each type (melting point, electrical conductivity etc.)
- Explain why the bonding leads to these physical properties and include images of the structures in your answer

Extension – Describe the structure and bonding in graphene, and research why there is a lot of interest in graphene as a new material

3. Energy Changes (10 points)

Energy changes always occur during chemical reactions. Reactions are exothermic, or endothermic

- Describe what the terms endothermic and exothermic mean and give examples of each type of reaction. Use energy level diagrams to help explain your answer
- Research how bond energies (bond enthalpies) can be used to calculate the overall energy change in a reaction, and give an example of a calculation in which bond energies are used in this way

Extension – Research how a catalyst affects the overall energy change in a chemical reaction. What effect does a catalyst have on the energy level diagrams?

4. Rates and Equilibria (10 points)

Chemists need to be able to control the rate and equilibrium position of reactions

- Describe what collision theory is, and use it to explain how at least 4 different factors will alter the rate of a chemical reaction when changed (eg. temperature)
- Describe how the rate of a chemical reaction can be obtained by graphical methods
- Describe what is meant by equilibrium, and explain how factors such as pressure and temperature can affect the position of this equilibrium. Use the Haber process as an example in your explanation

Extension – Research why compromise conditions are actually used in the Haber process

5. Organic Chemistry (10 points)

Organic molecules provide us with an important starting point for many important synthetic pathways to make medicines, fuels, polymers and other important chemicals

- Describe how fractional distillation is used to separate the hydrocarbons in crude oil
- Describe the difference between alkanes and alkenes, in terms of structure and properties
- Describe the rules for naming alkanes and alkenes, illustrating this for the first 6 molecules in each family of hydrocarbons
- Explain the process of cracking, and also how alkenes can be used to form addition polymers

Extension – Research other families of organic molecules such as alcohols and carboxylic acids

6. Formulae, Equations and Moles (10 points)

A strong grasp of formulae, equations and molar quantities is fundamental to understanding chemistry

- Describe the rules for writing formulae for ionic compounds eg. MgCl_2 , $\text{Al}_2(\text{SO}_4)_3$ and illustrate this with several examples
- Explain why it is essential that formulae equations are balanced
- Describe what a mole is (as a chemical quantity), and give a worked example demonstrating how the idea of moles is used in the calculation of chemical quantities in reacting mass calculations

Extension – Research and explain how to perform atom economy calculations. Illustrate your answer with a couple of examples, and explain why reactions that have a higher atom economy are favourable

Scoring grid for tasks

0	<u>No attempt</u>
1-2	A <u>partial attempt</u> at the task. Significant amounts of content are missing
3-4	A good attempt at <u>most of the task</u> . Key points may be missed or work may not be fully complete, scientific terminology may be weak or muddled or examples omitted
5-6	A good attempt at the <u>entire task</u> (excluding extension) but some key points may be missed, scientific terminology may be weak or muddled or examples omitted
7-8	A good attempt at the <u>entire task</u> (excluding extension) which is <u>detailed and mainly correct</u> and includes <u>correct scientific terminology</u> . Answer includes <u>well chosen, relevant examples</u>
9-10	A good attempt at the <u>entire task, including the extension</u> , which is <u>detailed and correct</u> and includes <u>correct scientific terminology</u> . Answer includes <u>well chosen, relevant examples</u>