1 Review of Scientific Method and Inorganic Chemistry for biologists

Themes
Science basics, units, quantities, abbreviations and symbols, steps in the scientific method, atomic structure, chemical bonds, acids/ bases, redox reactions, types of energy, thermodynamics' laws

Academic presentation skills
Using visuals to enhance the impact of your presentation

Academic reading skills
Skimming and scanning

Academic vocabulary skills
Academic word lists and collocations

English for Chemistry skills
Reading a chemical formula

Note-taking skills
Linear style with abbreviations and symbols

Discussion

Task 1 Work in pairs as instructed below.

1 Consider what science means to you. Then, devise a diagram with all the steps that a scientist takes before and after they conduct an experiment.

[1. Make an observation / 2. Conduct research / 3. Form hypothesis / 4. Test hypothesis / 5. Record data - Conduct an experiment / 6. Analyse data - Draw conclusion]

2 Compare your diagram with one of your peers.

3 Explain the difference between deductive and inductive reasoning and give examples.

[Deductive reasoning starts with a general theory or hypothesis and works its way down to a conclusion based on evidence.Inductive reasoning starts with a small observation and works its way to a theory by examining related issues. - All trouts are fish. All fish have gills. Therefore, all trouts have gils trouts have gills → Deductive]

4 Define (in)dependent variables and control group. Why are they important when testing a hypothesis?

[IV + DV +CG - IV is the variable that is changed or controlled in a scientific experiment to test the effects on the DV. DV is the Variable tested and measured. A control group is a group separated from the other groups in an experiment such that the independent variable (being tested) cannot influence the results.]

5 Discuss whether peer-reviewing is important in science.

[When a scientist completes their study or research, writes it up and submits it to a journal for publication, the journal editors send the article to several other scientists who work in the same field (the 'peers'). The peer reviewers are experts who subject ones work to critical analysis and evaluation and decide whether it is valid, novel, or objective enough to be published.]

Note-taking practice

1 Listen to the lecture on the nature of science and write down only what you think is very important to remember. Did the lecturer hold the same views on the issues you discussed earlier? Why? Why not?

https://www.youtube.com/watch?v=g4ssKR3_K-k

2 In pairs, use your notes to write up the accompanying presentation slides. What would you include? What would you leave out?

3 Check your slides with the following guidelines to see if you met the necessary standards for an effective scientific presentation.

Presentations slides Using visuals to enhance the impact of your presentation

When giving a scientific presentation you need to take into account the following tried-and-tested elements that very successful presenters often employ:

1 Introduce the title of your presentation, your name and university department.

2 Pose a question to engage the audience.

3 Describe the structure to your presentation by giving an overview.

4 Define any subject-specific or technical terms in advance.

5 Display schemes (Fig. 1), figures or word tables (Table 1) that encapsulate the subject matter or points raised.

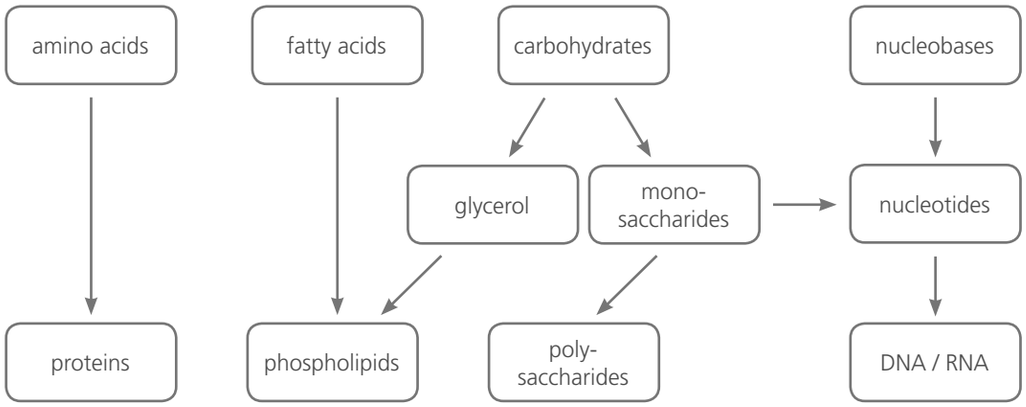

Figure 1 Sample of scheme as a presentation visual regarding biomolecules

STATE	ATOMIC/ MOLECULAR MOTION	ATOMIC/ MOLECULAR SPACING	SHAPE	VOLUME	COMPRESSIBILITY
Solid	Oscillation/vibration about fixed point	Close together	Definite	Definite	Incompressible
Liquid	Free to move relative to one another	Close together	Indefinite	Definite	Incompressible
Gas	Free to move relative to one another	Far apart	Indefinite	Definite	Compressible

Table 1 Properties of liquids, solids and gases

6 Use bullet points with key words instead of long texts, paragraphs or sentences (Fig. 2).

Biomolecules in living things

Four groups of organic compounds found in living things are:

carbohydrates
lipids
nucleic acids
proteins

Figure 2 Sample of presentation visual using bullet points

7 Ask a rhetorical question to help the audience focus on the next theme.

8 Use transition phrases/words to highlight the next point, e.g. Moving on, …

9 Use additional visual aids (diagrams or charts) that are clear and self-explicatory.

10 Provide research evidence with citations, i.e. (Smith, 2018), to support your argument.

11 Give a succinct conclusion.

12 End the presentation with key references so that the audience can read more on the same subject, i.e. Smith, A. F. (2018) Introduction to Science Communication.

Task 2 Use the guidelines above and the reading below to make the first four visuals for an academic presentation.

Reading skills Skimming and scanning

University students are often asked to read a variety of resources before they decide what is relevant to their research topic. To save time, they often use two speed reading techniques such as skimming and scanning.

[**skimming can save hours of laborious reading!**]

Skimming involves identifying the main points or prevalent themes without reading every word in the text. You can do so by identifying the purpose of the text and reading the topic sentences or the subheadings if there are any. You can also look for any illustrations or signposting language like "**Unlike** the properties of solids,…". If you are familiar with the subject discussed you might as well skip it altogether.

Task 3 Skim the text and answer the following questions:

- What is the purpose of the first reading? **[introduces key principles of inorganic chemicals]**
- What are the main points raised in it? **[see the subheading]**
- How are the ideas in the text organised? **[in short paragraphs or texts with a subheading]**

Scanning involves locating more detailed information such as numbers, symbols and long words. It becomes easier if it follows skimming. Reading the introduction and the conclusion of an article so as to check if its content is relevant to your research is a very useful technique.

Task 4 Find words in the text that describe reactions.
[circled on pages 24-25]

Task 5 What examples are provided for covalent bonds?
[see page 24 - "Chemical Bonds" and page 28 - "reversible reactions" and half reactions on page 43.]