

Pre-induction Activity

Welcome to BTEC Applied Science!

Complete the following tasks to prepare yourself for studying BTEC Applied Science this year:

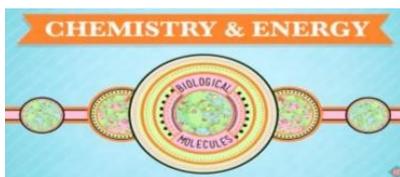
Biology Tasks:

Watch the following videos:



Welcome to Biology:

<https://www.youtube.com/watch?v=7L7x0BAqWis>



Biological Molecules:

<https://www.youtube.com/watch?v=7L7x0BAqWis>



Protein Folding:

<https://www.youtube.com/watch?v=hok2hyED9go>

Access Seneca learning (if the link does not work then copy and paste into your browser)

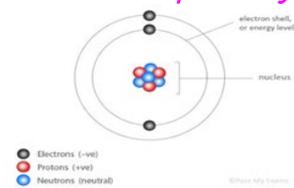
<https://app.senecalearning.com/classroom/course/d0ce0c30-6417-11e8-8edc-d9cd1c890408/section/d4230390-6417-11e8-8edc-d9cd1c890408/session>

Complete Biological Molecules sections 1.1 and 1.2

Chemistry Tasks:

Part 1: Atomic structure

Need help in parts 1 and 2? <https://tinyurl.com/y4bdmsgz>



What you know from GCSE:

- Electrons orbit the nucleus in energy levels (called shells)
- The first level can hold a maximum of 2 electrons, the second can hold 8 and the third can hold a maximum of 8.

Q1. Draw a diagram to show the electron arrangement of the following elements-

- Carbon
- Fluorine
- Magnesium
- Sulphur
- Argon

Part 2: The periodic table

The periodic table gives you two numbers:

- Atomic number = It is also called the proton number as it gives the number of protons in the nucleus.
- Relative atomic mass = A_r . This gives you an average mass of all the isotopes

The Periodic Table of the Elements

(1)	(2)	Key										(3)	(4)	(5)	(6)	(7)	(0)
1	2	atomic number										13	14	15	16	17	18
H	He	Symbol										B	C	N	O	F	Ne
hydrogen	helium	name										boron	carbon	nitrogen	oxygen	fluorine	neon
1.0	4.0	relative atomic mass										10.8	12.0	14.0	16.0	19.0	20.2
3 Li lithium 6.9	4 Be beryllium 9.0											5 B boron 10.8	6 C carbon 12.0	7 N nitrogen 14.0	8 O oxygen 16.0	9 F fluorine 19.0	10 Ne neon 20.2
11 Na sodium 23.0	12 Mg magnesium 24.3											13 Al aluminium 27.0	14 Si silicon 28.1	15 P phosphorus 31.0	16 S sulphur 32.1	17 Cl chlorine 35.5	18 Ar argon 39.9
19 K potassium 39.1	20 Ca calcium 40.1	21 Sc scandium 45.0	22 Ti titanium 47.9	23 V vanadium 50.9	24 Cr chromium 52.0	25 Mn manganese 54.9	26 Fe iron 55.8	27 Co cobalt 58.9	28 Ni nickel 58.7	29 Cu copper 63.5	30 Zn zinc 65.4	31 Ga gallium 69.7	32 Ge germanium 72.6	33 As arsenic 74.9	34 Se selenium 79.0	35 Br bromine 79.9	36 Kr krypton 83.8
37 Rb rubidium 85.5	38 Sr strontium 87.6	39 Y yttrium 88.9	40 Zr zirconium 91.2	41 Nb niobium 92.9	42 Mo molybdenum 95.9	43 Tc technetium	44 Ru ruthenium 101.1	45 Rh rhodium 102.9	46 Pd palladium 106.4	47 Ag silver 107.9	48 Cd cadmium 112.4	49 In indium 114.8	50 Sn tin 118.7	51 Sb antimony 121.8	52 Te tellurium 127.6	53 I iodine 126.9	54 Xe xenon 131.3
55 Cs caesium 132.9	56 Ba barium 137.3	57-71 lanthanoids	72 Hf hafnium 178.5	73 Ta tantalum 180.9	74 W tungsten 183.8	75 Re rhenium 186.2	76 Os osmium 190.2	77 Ir iridium 192.2	78 Pt platinum 195.1	79 Au gold 197.0	80 Hg mercury 200.6	81 Tl thallium 204.4	82 Pb lead 207.2	83 Bi bismuth 209.0	84 Po polonium	85 At astatine	86 Rn radon
87 Fr francium	88 Ra radium	89-103 actinoids	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium	109 Mt meitnerium	110 Ds darmstadtium	111 Rg roentgenium	112 Cn copernicium	114 Fl flerovium	116 Lv livermorium				

Q2. The periodic table is the way of arranging the chemical elements in order of increasing _____

Q3. What does the group number indicate?

Q4. What does the period number indicate?

Q5. What is meant by isotopes?

Individual isotopes of an element have a mass number:

- The mass number gives the total number of neutrons + protons. This cannot be found on the periodic table.

Q6. Copy and Complete the table for individual isotopes of some elements:

Element	Symbol	Z	A	No. protons	No. neutrons	No. electrons
Sodium			23			
		6	12			
		12			12	
		84	210			
Chlorine		17	35			
Chlorine		17	37			

Part 3: Molecular formulae and Relative formula mass (M_r)

Compounds (and some elements, such as O_2) are formed when more than one atom bonds together. These compounds or elements have a chemical formula.

Formulae tell you the number of each type of atom that are present in a compound.

Q7. How many of each type of atom are in:

- $BaCl_2$
- K_2O
- Ag_2SO_4
- $Mg(NO_3)_2$
- $(NH_4)_3PO_4$

Relative formula mass (or relative molecular mass) tells you the relative mass of a compound or element. It is worked out by adding together the A_r , or relative atomic mass, of all atoms of a compound.

- Use A_r and NOT mass number.

Q8 Work out the M_r of each of the compounds

- $BaCl_2$
- K_2O
- Ag_2SO_4
- $Mg(NO_3)_2$
- $(NH_4)_3PO_4$

Part 4: Balancing Equations

Q9 You will be asked to balance various equations as part of your chemistry studies. Balance the following symbol equations_



Part 5: Chemical formulas

Q10 What is the chemical formula of

- a. Sulphuric acid
- b. Nitric acid
- c. Hydrochloric acid
- d. Phosphoric acid

Physics Tasks

You will be using a lot of maths in your physics units complete the following: **Show your working for any calculations.**

A. Large and small numbers and standard form:

1. Write 100 000 as a power of 10
2. Write 0.001 as a power of 10
3. Write 2530 in standard form
4. Write 0.0091 in standard form
5. Write 8.31×10^6 as a normal number
6. Write 6.002×10^{-2} as a normal number

B. Metric prefixes

1. Convert 326.9 GW into W. Express in standard form.
2. Convert 54 600 mm into m. Express in standard form.
3. Convert 1002 mV into V. Express in standard form.
4. Convert 9212 km into m. Express in standard form
5. Write $2.3 \times 10^2 \mu\text{m}$ in m. Express in standard form

C. Using your calculator (express your answer in standard form to three significant figures)

1. Calculate 423π
2. Calculate the number of seconds in a week.

3. The charge of an electron is 1.6×10^{-19} C. Calculate the total charge of one mole of electrons. (1 mole of electrons contains 6.02×10^{23} electrons)
4. Calculate $(1 \times 10^{-3})^2 \times 3.14 / 4$
5. Calculate $5.11 \times 10^5 \times [1.6 \times 10^{-19} / (3.0 \times 10^8)^2]$

D. Rearranging equations

1. $E = \frac{1}{2} mv^2$ (make v the subject)
2. $A = \pi r^2$ (make r the subject)
3. $F = ma$ (make a the subject)
4. $E = mc^2$ (make m the subject)
5. $v^2 = u^2 + 2as$ (make a the subject)
6. $F = GMm/r^2$ (make M the subject)

Equipment list

Pen, pencil, ruler, scientific calculator, A4 lever arch file, Dividers for Units, highlighter, lab coat (optional)

Recommended Books and wider reading

The Applied Science department will provide booklets and handouts for all students which will cover unit material however for additional references please see below:

