

Atoms

Q1 Complete the following sentences.

- a) Neutral atoms have a charge.
- b) A charged atom is called an
- c) A neutral atom has the same number of and
- d) If an electron is added to a neutral atom, the atom becomes charged.

| Particle | Mass | Charge |
|----------|------|--------|
| Proton | 1 | |
| | 1 | 0 |
| Electron | | -1 |



Q3 What am I?

Choose from: **nucleus** **proton** **electron** **neutron**

- a) I am in the centre of the atom. I contain protons and neutrons.
- b) I move around the nucleus in a shell.
- c) I am the lightest.
- d) I am positively charged.
- e) I am heavy and have no charge.
- f) In a neutral atom there are as many of me as there are electrons.

Q4 Elements have a **mass number** and an **atomic number**.

- a) What does the **mass number** of an element tell you about its atoms?
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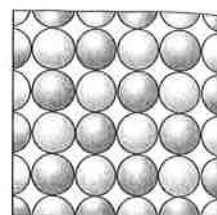
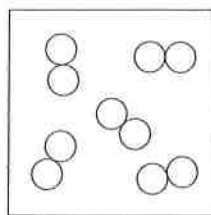
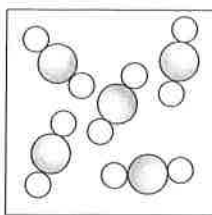
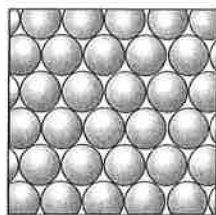
- b) What does the **atomic number** of an element tell you about its atoms?
.....

- c) Fill in this table using a periodic table.

| Element | Symbol | Mass Number | Number of Protons | Number of Electrons | Number of Neutrons |
|---------|--------|-------------|-------------------|---------------------|--------------------|
| Sodium | Na | | 11 | | |
| | | 16 | 8 | 8 | 8 |
| Neon | | | 10 | 10 | 10 |
| | Ca | | | 20 | 20 |

Elements, Compounds and Isotopes

Q1 a) Correctly label the following diagrams as either 'element' or 'compound'.



A = B = C = D =

b) Suggest which diagram (A, B, C or D) could represent:

i) oxygen ii) sodium iii) sodium chloride iv) carbon dioxide

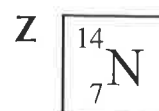
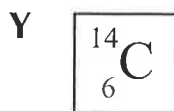
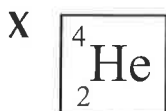
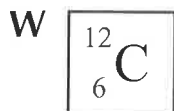
Q2 Circle the **correct words** in these sentences.

- Compounds** / **Atoms** are formed when two or more elements react together.
- The properties of compounds are **exactly the same as** / **completely different to** the original elements.
- It is **easy** / **difficult** to separate the elements in a compound.
- Carbon dioxide is a **compound** / **an element**, whereas iron is a **compound** / **an element**.
- The number of **neutrons** / **electrons** determines the chemistry of an element.

Q3 Choose the correct words to **complete** this paragraph.

| electrons | element | isotopes | protons | compound | neutrons |
|---|---------|----------|---------|----------|----------|
| <p>..... are different atomic forms of the same which have the same number of but a different number of</p> | | | | | |

Q4 Which of the following atoms are **isotopes** of each other? Explain your answer.



Answer and

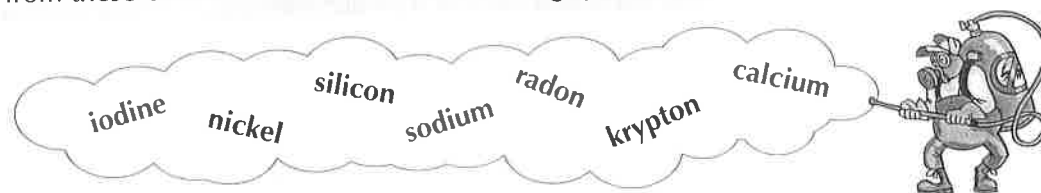
Explanation

Q5 Explain why **carbon-14** (an unstable isotope) is very useful to **historians**.

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The Periodic Table

Q1 Select from these **elements** to answer the following questions.



- a) Which two are in the same group? and
- b) Name an alkali metal.
- c) Name a transition metal.
- d) Name an element with seven electrons in its outer shell.
- e) Name a non-metal which is not in group 0.

Q2 **True or false?**

- a) Elements in the same **group** have the same number of electrons in their outer shell.
- b) The periodic table shows the elements in order of ascending **atomic mass**.
- c) Each **column** in the periodic table contains elements with similar properties.
- d) The periodic table is made up of all the known compounds.
- e) There are more than 100 known elements.

True False

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|--------------------------|--------------------------|
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Q3 Elements in the same group undergo **similar reactions**.

- a) Tick the pairs of elements that would undergo similar reactions.

A potassium and rubidium

C calcium and oxygen

B helium and fluorine

D calcium and magnesium

- b) Explain why fluorine and chlorine undergo similar reactions.

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.....

Q4 Complete the following table.

| | Alternative Name for Group | Number of Electrons in Outer Shell |
|-----------|----------------------------|------------------------------------|
| Group I | Alkali metals | |
| Group VII | | 7 |
| Group 0 | | * |

* excluding helium

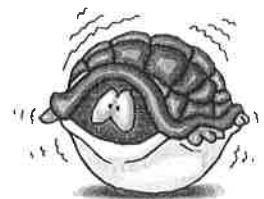
Electron Shells

Q1 a) Tick the boxes to show whether each statement is **true** or **false**.

True False

- i) Electrons occupy shells in atoms.
- ii) The highest energy levels are always filled first.
- iii) Atoms are most stable when they have partially filled shells.
- iv) Noble gases have a full outer shell of electrons.
- v) Reactive elements have full outer shells.

| | |
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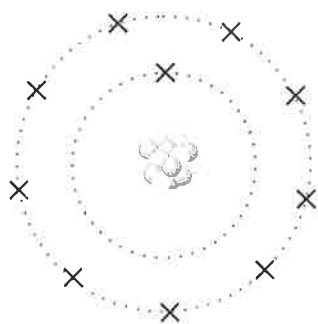
b) Write out corrected versions of the **false** statements.

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Q2 Describe **two** things that are wrong with this diagram.



1.
-
2.
-

Q3 Write out the **electron configurations** for the following elements.

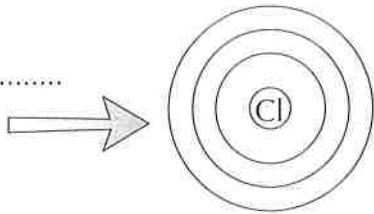
- | | |
|--------------------|--------------------|
| a) Beryllium | d) Calcium |
| b) Oxygen | e) Aluminium |
| c) Silicon | f) Argon |

Q4 Do the following groups of elements contain **reactive** or **unreactive** elements? Explain your answers in terms of **electron shells**.

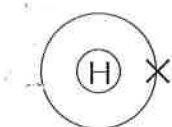
- a) Noble gases
-
- b) Alkali metals
-

Electron Shells

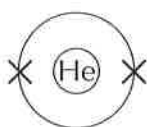
Q5 Chlorine has an atomic number of 17.

- a) What is its electron configuration?
- b) Draw the electrons on the shells in the diagram. 
- c) Why does chlorine react readily?
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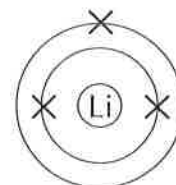
Q6 Draw the **full electron configurations** for these elements. (The first three have been done for you.)



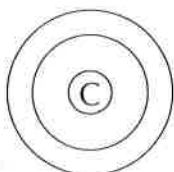
Hydrogen



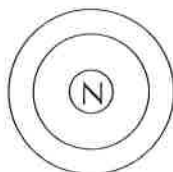
Helium



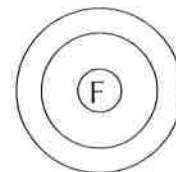
Lithium



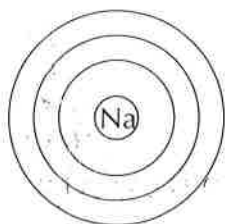
a) Carbon



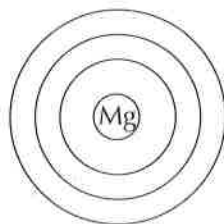
b) Nitrogen



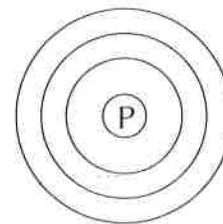
c) Fluorine



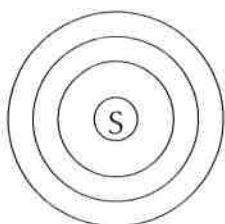
d) Sodium



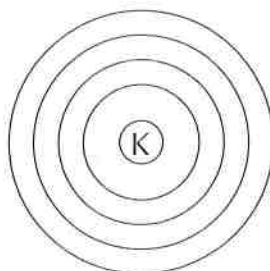
e) Magnesium



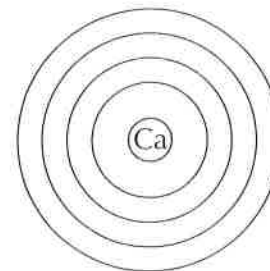
f) Phosphorus



g) Sulfur



h) Potassium



i) Calcium

Top Tips:

Once you've learnt the 'electron shell rules' these are pretty easy — the first shell can only take 2 electrons, and the second and third shells a maximum of 8 each. Don't forget it.