

Atomic Theory Revision

Write the date in the margin of your homework jotter.
Write the title of this Exercise as a heading: Atomic Theory Revision



1.

Electrons are particles which

- a. can have either a positive or negative charge
- b. have a negative charge
- c. have no charge
- d. have a positive charge

2.

Which line in the table correctly describes a proton?

	Mass	Charge	Location
A	negligible	0	outside nucleus
B	negligible	-1	outside nucleus
C	1	+1	in nucleus
D	1	0	in nucleus

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An atom has 26 protons, 26 electrons and 30 neutrons. The atom has

- A atomic number 26, mass number 56
- B atomic number 56, mass number 30
- C atomic number 30, mass number 26
- D atomic number 52, mass number 56.

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Which of the following is the electron arrangement for a noble gas?

(You may wish to use page 1 of the data booklet to help you.)

- A 2, 5
- B 2, 6
- C 2, 7
- D 2, 8

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The nucleus of an atom

- a. is positively charged
- b. is negatively charged
- c. contains both positive and negatively charged particles
- d. has no charged particles

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Which line in the table describes a **neutron**?

	Mass	Charge
A	1	-1
B	negligible	0
C	1	+1
D	1	0

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An atom is neutral because

- A the number of electrons equals the total number of protons plus neutrons
- B the number of neutrons equals the total number of electrons plus protons
- C the number of protons equals the number of neutrons
- D the number of electrons equals the number of protons.

12.

The table shows information about an **ion**.

Particle	Number
protons	19
neutrons	20
electrons	18

The charge on the ion is

- A 1+
- B 1-
- C 2+
- D 2-

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Different isotopes of the same element have identical

- A nuclei
- B mass numbers
- C numbers of neutrons
- D numbers of protons.

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Which of the following does not contain covalent bonds?

- A Sulfur
- B Copper
- C Oxygen
- D Hydrogen

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2,8,8 is the electron arrangement for an atom of an element belonging to the

- A halogens
- B noble gases
- C alkali metals
- D transition metals.

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When an atom X of an element in Group 1 reacts to become X^+

- A the mass number of X decreases
- B the atomic number of X increases
- C the charge of the nucleus increases
- D the number of occupied energy levels decreases.

13.

Which of the following particles contains a different number of electrons from the others?

You may wish to use the data booklet to help you.

- A Cl^-
- B S^{2-}
- C Ar
- D Na^+

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Which of the following numbers is the same for lithium and oxygen atoms?

- A atomic number
- B number of occupied electron shells
- C mass number
- D number of outer electrons

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An atom has atomic number 23 and mass number 51.

The number of electrons in the atom is

- A 23
- B 28
- C 51
- D 74.

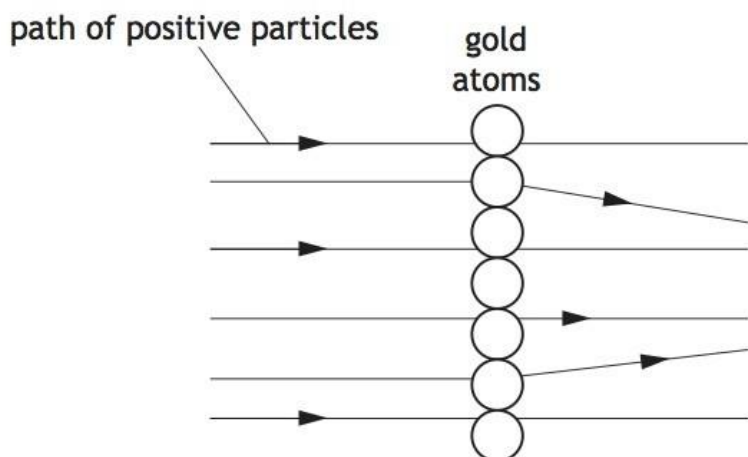
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The table shows information about some particles.

Particle	Number of		
	protons	neutrons	electrons
A	9	10	10
B	11	12	11
C	15	16	15
D	19	20	18

Identify the particle which is a negative ion.

In 1911, Ernest Rutherford carried out an experiment to confirm the structure of the atom. In this experiment, he fired positive particles at a very thin layer of gold foil. Most of the particles passed straight through but a small number of the positively charged particles were deflected.



- (a) What caused some of the positive particles to be deflected in this experiment?
- (b) Gold is the heaviest element to have only one naturally occurring isotope.

The isotope has a mass number of 197.

- (i) Complete the table to show the number of each type of particle in this gold atom.

You may wish to use the data booklet to help you.

<i>Particle</i>	<i>Number</i>
Proton	
Electron	
Neutron	

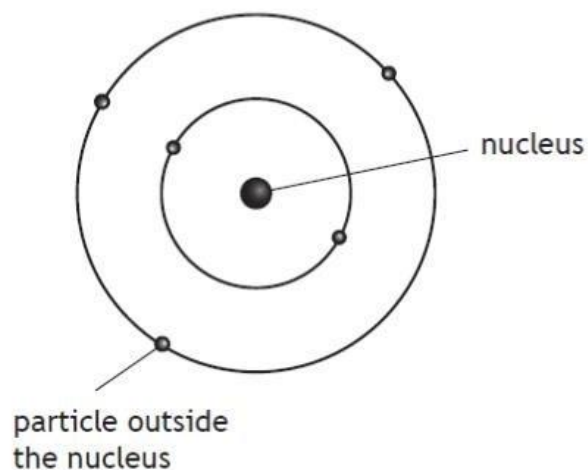
- (ii) Most elements have more than one isotope.
State what is meant by the term isotope.

Copy and complete the following table

Element	Atomic number	Mass number	Number protons	Number neutrons	Electron arrangement
Carbon	6	12			
Potassium		39			2,8,8,1
			18	22	

19.

Elements are made up of atoms.



(a) Complete the tables to show the missing information.

(i) 1

In the Nucleus		
<i>Particle</i>	<i>Relative Mass</i>	<i>Charge</i>
proton		+1
neutron	1	

(ii) 1

Outside the Nucleus		
<i>Particle</i>	<i>Relative Mass</i>	<i>Charge</i>
	almost zero	

(b) A sample of nitrogen was found to contain equal amounts of two isotopes. One isotope has mass number 14 and the other has mass number 15.

What is the relative atomic mass of this sample of nitrogen? 1

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Name the elements with the following electron arrangements:

(i) 2,8,1 (ii) 2,8,8 (iii) 2,4 (iv) 2,8,7

21.

The table shows the numbers of protons, electrons and neutrons in four particles, W, X, Y and Z.

<i>Particle</i>	<i>Protons</i>	<i>Electrons</i>	<i>Neutrons</i>
W	17	17	18
X	11	11	12
Y	17	17	20
Z	18	18	18

Which pair of particles are isotopes?

- A W and X
- B W and Y
- C X and Y
- D Y and Z

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The group 7 element bromine was discovered by Balard in 1826.

Bromine gets its name from the Greek 'bromos' meaning stench.

Bromine consists of a mixture of two isotopes, ${}^{79}_{35}\text{Br}$ and ${}^{81}_{35}\text{Br}$.

- (a) What is meant by the term isotope? 1
- (b) Complete the table for ${}^{79}_{35}\text{Br}$. 1

<i>Isotope</i>	<i>Number of protons</i>	<i>Number of neutrons</i>
${}^{79}_{35}\text{Br}$		

- (c) The relative atomic mass of an element can be calculated using the formula:

$$\frac{(\text{mass of isotope A} \times \% \text{ of isotope A}) + (\text{mass of isotope B} \times \% \text{ of isotope B})}{100}$$

A sample of bromine contains 55% of the isotope with mass 79 and 45% of the isotope with mass 81.

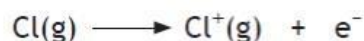
- Calculate the relative atomic mass of bromine in this sample. 2
- Show your working clearly.

Electrons can be removed from all atoms.

The energy required to do this is called the ionisation energy.

The first ionisation energy for an element is defined as the energy required to remove one mole of electrons from one mole of atoms, in the gaseous state.

The equation for the first ionisation energy of chlorine is



- (a) State the electron arrangement for the $\text{Cl}^{\text{+}}$ ion.

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You may wish to use the data booklet to help you.

- (c) Information on the first ionisation energy of some elements is given in the table.

<i>Element</i>	<i>First ionisation energy (kJ mol⁻¹)</i>
lithium	526
fluorine	1690
sodium	502
chlorine	1260
potassium	425
bromine	1150

Describe the trend in the first ionisation energy going down a group in the Periodic Table.

1



A marking guide for this Homework is available (password required).