

# Atomic Structure and the periodic table H

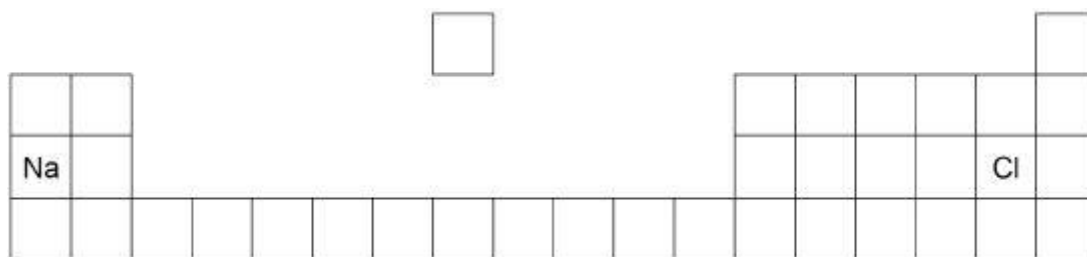
<https://SIYYOEX.exampro.net>

## Q1.

This question is about sodium and chlorine.

Figure 1 shows the positions of sodium and chlorine in the periodic table.

Figure 1



- (a) State **one** difference and **one** similarity in the electronic structure of sodium and of chlorine.

Difference \_\_\_\_\_

\_\_\_\_\_

Similarity \_\_\_\_\_

\_\_\_\_\_

(2)

- (b) Sodium atoms react with chlorine atoms to produce sodium chloride (NaCl).

Describe what happens when a sodium atom reacts with a chlorine atom.

Write about electron transfer in your answer.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

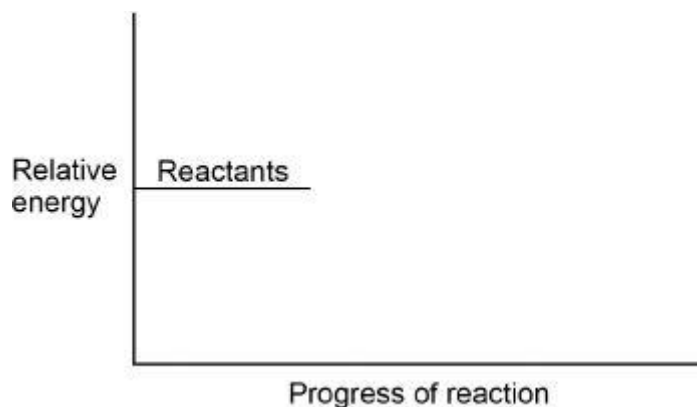
\_\_\_\_\_

\_\_\_\_\_

(4)

- (c) The reaction between sodium and chlorine is an exothermic reaction.  
Complete the reaction profile for the reaction between sodium and chlorine.

**Figure 2**



(2)  
(Total 8 marks)

**Q2.**

This question is about the periodic table.

In 1864 John Newlands suggested an arrangement of elements.

**Figure 1** shows the arrangement Newlands suggested.

**Figure 1**

1	2	3	4	5	6	7
H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe

- (a) Give **two** differences between the groupings in **Figure 1** compared with the modern periodic table.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

(2)

In 1869 Mendeleev produced his periodic table.

- (b) Why was Mendeleev's table called a periodic table?

\_\_\_\_\_



**Statement**

**Letter representing  
element**

An alkali metal

A

An element consisting of  
molecules

D

An element that has atoms  
with the electronic structure  
2.8.3

E

G

J

(3)  
(Total 10 marks)

## Mark schemes

### Q1.

- (a) (difference)  
sodium has one and chlorine has seven electrons in outer level / shell  
**or**  
number of electrons  
*number of electrons must be correct if quoted*

1

- (similarity)  
both have three / same number of levels / shells  
**or**  
have electrons in third level / shell  
**or**  
both have incomplete (outer) levels / shells  
*allow both have 2 electrons in inner shell*  
**or**  
*both have 8 electrons in second shell*  
**or**  
*both are one electron away from full outer level / shell*

1

- (b) sodium (atom) loses  
*allow moves / transfers for loses*  
*do **not** accept sodium ion loses*

1

one (outer shell electron)

1

chlorine (atom) gains  
*do **not** accept chloride*

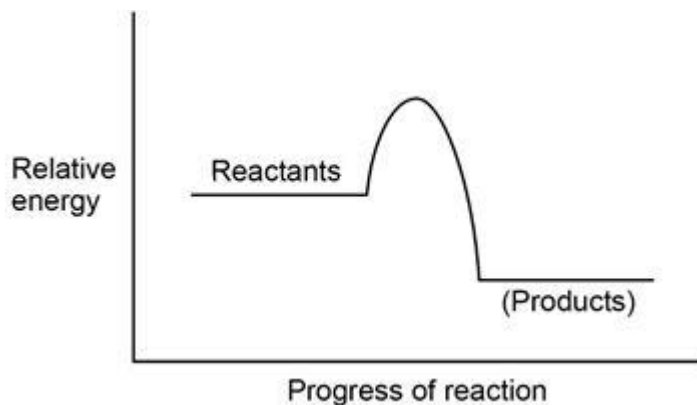
1

one (electron)

1

*transfer of 1 electron from chlorine to sodium **max 2** marks*  
*reference to sharing or covalent bonding **max 3** marks*  
*allow marks from suitable diagram(s)*

- (c)



*ignore labels*  
*any curve / line going up and then down*  
*products line below reactants*  
*allow curve to start / finish anywhere along reactant / product lines*

1  
1

[8]

**Q2.**

(a) any **two** from:

- hydrogen is in a group  
*allow converse arguments*  
*allow hydrogen is with the halogens*
- only seven groups
- no group 0  
*allow no noble gases*
- halogens are in Group 1  
*allow fluorine and / or chlorine are in Group 1*
- other elements are in one group higher  
*allow one example of this*
- transition metals included in groups  
*allow one example, eg, iron in same group as aluminium*

2

(b) similar properties occur at regular intervals

1

(c) some elements appeared to be in the wrong group

1

(when) the elements were arranged in order of relative atomic mass

*allow (so) he placed them into groups with similar properties*

1

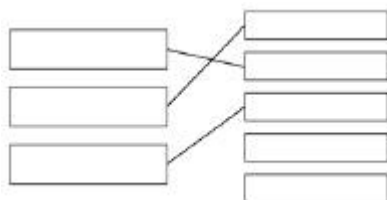
(d) most elements are mixtures of isotopes

1

(so) should be arranged in order of atomic number

1

(e)



1  
1  
1

[10]