O Level Combined Chemistry Structured

Chemical Bonding Test 3.0

Q1

(a) When atoms combine with other atoms, they either gain, lose or share electrons. Describe in terms of the number of electrons gained, lost or shared when

(i) a carbon atom combines with oxygen atom(s),

.....

.....

.....

[2]

(ii) a sodium atom combines with chlorine atom(s).

.....

.....

.....

[2]

Q2

Draw 'dot and cross' diagrams to show the bonding in potassium chloride and chlorine molecule. Show only the outer electrons in your diagrams. [4]

potassium chloride chlorine

Suggest whether aqueous potassium chloride is a conductor of electricity. Explain your answer. [1]

Q3

State the type of bonding found in a molecule of ammonia gas.

..... [1]

Draw the 'dot and cross' diagram of a molecule of ammonia gas. Show only the valence electrons.

[2]

Q4

Table 2.1 shows a list of particles with their respective number of protons, neutrons and electrons.

Particle	Number of protons	Number of neutrons	Number of electrons
P	1	0	1
Q	2	3	2
R	5	6	5
S	7	7	10
T	9	10	9

Table 2.1

(e)(i) Draw the dot-and-cross diagram of the compound formed between **P** and **T**. [2]

(ii) Describe in terms of bonding and structure whether the compound formed in (e)(i) would have a high or low boiling point. [2]

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Q5

Figure 4.1 shows the setup where the beaker contains powder magnesium chloride and Figure 4.2 shows the setup where the beaker contains magnesium chloride solution.

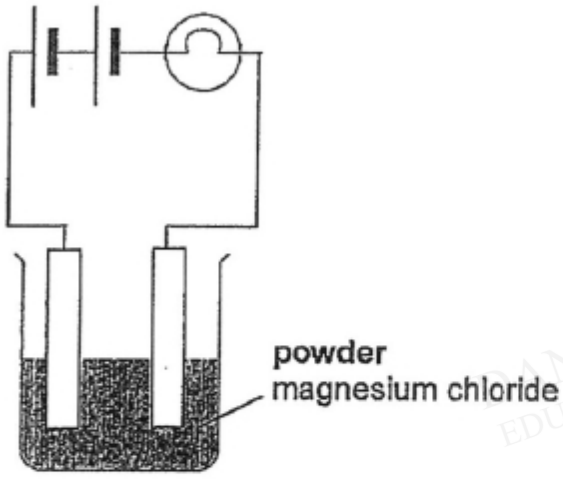


Figure 4.1

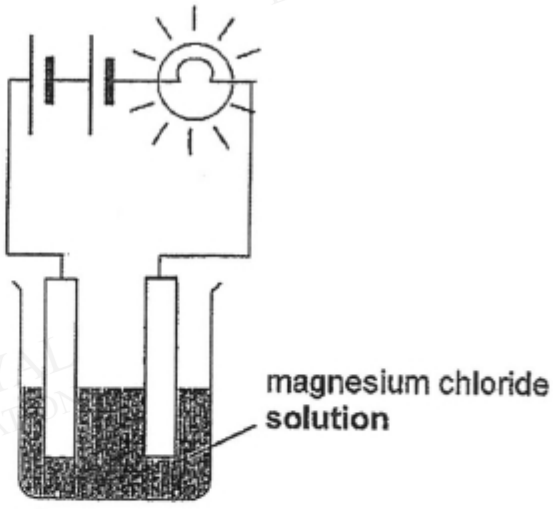


Figure 4.2

(a) Explain why the light bulb in **figure 4.1** did not light up whereas the light bulb in **figure 4.2** is lighted up. [3]

.....

.....

.....

(b) Draw the dot-and-cross diagram of magnesium chloride. [2]

Answers

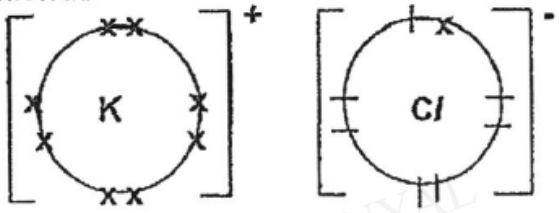
Chemical Bonding Test 3.0

Q1

iai	Carbon: 2, 4 Oxygen: 2, 6 Each carbon atom **shares 1 pair of electrons/2 electrons** each with **2 oxygen atoms** to have stable octet configuration/noble gas structure.
ii	Na: 2, 8, 1 Chlorine: 2, 8, 7 Each sodium atom **loses 1 electron** to 1 chlorine atom to form Na^+ (2, 8) with stable octet/noble gas structure Each chlorine atom **gains one electron** to form Cl^- (2, 8, 8) with octet/noble gas structure.

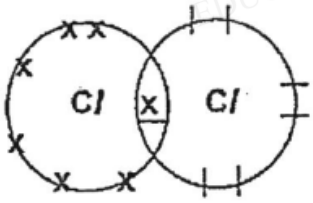
Q2

(c) potassium chloride



cation [1]
anion [1]

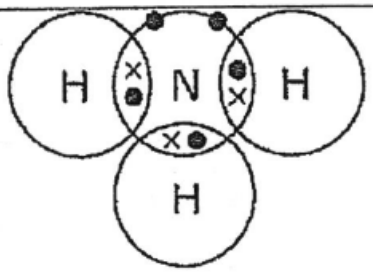
chlorine



bonding electrons [1]
unbonded electrons [1]

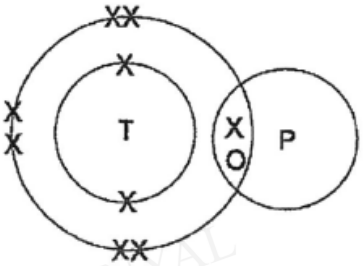
(d) It is a conductor of electricity as it contains mobile ions. [1]

Q3

Covalent	[1]
	[1] - correct number of electrons [1] - correct number electrons shared

Q4

(e)(i) Draw the dot-and-cross diagram of the compound formed between **P** and **T**. [2]



[1]: correct ratio of P to T
[1]: sharing of 1 pair of electrons

(ii) Describe in terms of bonding and structure whether the compound formed in (e)(i) would have a high or low boiling point. [2]

Has a simple molecular structure with weak attraction forces between the molecules [1]

As a result low amount of energy is needed to break these forces leading to a low boiling point. [1]

Q5

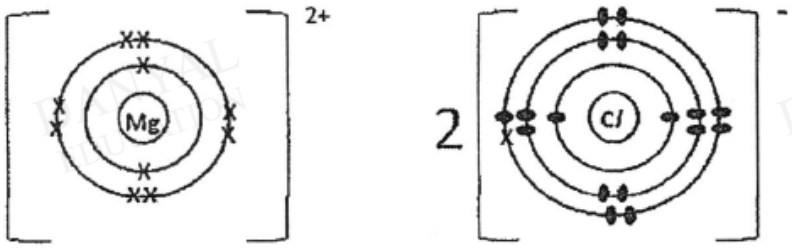
(a) Explain why the light bulb in **figure 4.1** did not light up whereas the light bulb in **figure 4.2** is lighted up. [3]

Powder magnesium chloride does not have free moving ions [1]

To carry electrical charges and hence light bulb did not light up. [1]

However in magnesium chloride solution, there are free moving ions [1]

(b) Draw the dot-and-cross diagram of magnesium chloride. [2]



Symbol
X : electron of Mg
● : electron of Cl

[1]: correct drawing for magnesium ion

[1]: correct drawing for the chloride ion