

3.2.3 Molecules and Covalent Bonds

Question Paper

Level	IGCSE
Subject	Chemistry (0620)
Exam Board	Cambridge International Examinations (CIE)
Topic	Atoms Elements and Compounds
Sub-Topic	3.2.3 Molecules and Covalent Bonds
Booklet	Question Paper

Time Allowed: 28 minutes

Score: /23

Percentage: /100

Grade Boundaries:

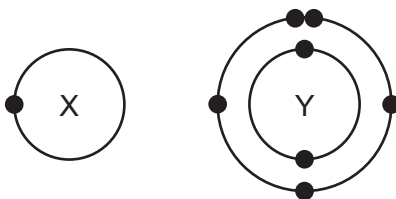
A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

- 1 The table shows the electronic structure of four atoms.

atom	electronic structure
W	2,8,1
X	2,8,4
Y	2,8,7
Z	2,8,8

Which two atoms combine to form a covalent compound?

- A** W and X **B** W and Y **C** X and Y **D** X and Z
- 2 The electronic structures of atoms X and Y are shown.

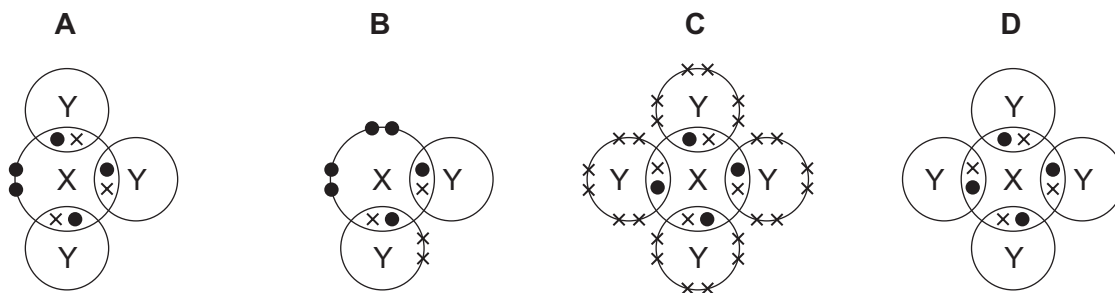


X and Y form a covalent compound.

What is its formula?

- A** XY_5 **B** XY_3 **C** XY **D** X_3Y
- 3 In the following diagrams, X and Y are atoms of different elements.

Which diagram correctly shows the arrangement of outer electrons in a molecule of methane?



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- 4 In which compounds are pairs of electrons shared between atoms?
- 1 methane
 - 2 lead bromide
 - 3 sodium chloride
- A** 1 only **B** 2 only **C** 1 and 3 **D** 1, 2 and 3

- 5 Which statement about bonding is **not** correct?
- A** Carbon can form four single covalent bonds.
 - B** Chlorine atoms react to gain a noble gas electronic structure.
 - C** Covalent bonding involves losing and gaining electrons.
 - D** Hydrogen molecules have the formula H₂.

- 6 Covalent bonds are formed when electrons are1..... .
Most covalent compounds have2..... electrical conductivity.
Which words correctly complete gaps 1 and 2?

	1	2
A	shared	high
B	shared	low
C	transferred	high
D	transferred	low

- 7 Sodium chloride is an ionic solid.
Which statement is **not** correct?
- A** Ions are formed when atoms lose or gain electrons.
 - B** Ions in sodium chloride are strongly held together.
 - C** Ions with the same charge attract each other.
 - D** Sodium chloride solution can conduct electricity.

- 8 Caesium chloride and rubidium bromide are halide compounds of Group I elements.

Caesium chloride has the formula1....., a relative formula mass2..... that of rubidium bromide and bonds that are3..... .

Which words correctly complete gaps 1, 2 and 3?

	1	2	3
A	CaCl	different from	ionic
B	CaCl	the same as	covalent
C	CsCl	different from	ionic
D	CsCl	the same as	covalent

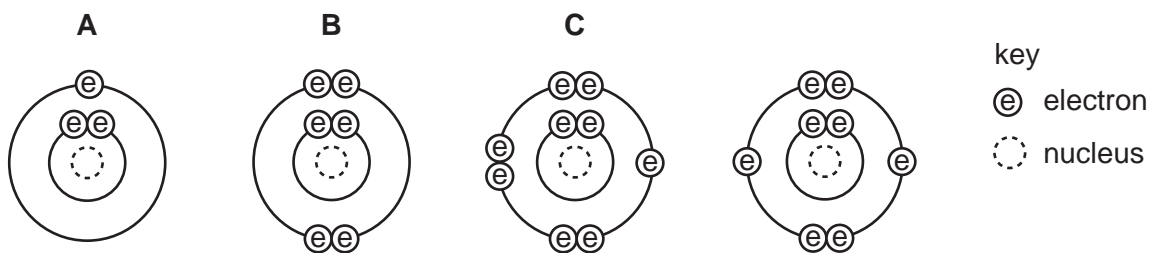
- 9 Element X is in Group I of the Periodic Table. X reacts with element Y to form an ionic compound.

Which equation shows the process that takes place when X forms ions?

- A** $\text{X} + \text{e}^- \rightarrow \text{X}^+$
B $\text{X} - \text{e}^- \rightarrow \text{X}^-$
C $\text{X} + \text{e}^- \rightarrow \text{X}^-$
D $\text{X} - \text{e}^- \rightarrow \text{X}^+$

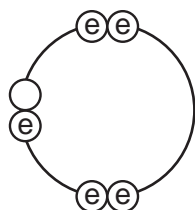
- 10 The diagrams show the electron arrangements in the atoms of four elements.

Which element does **not** form a covalent bond?



- 11 Which statement about the bonding in a molecule of water is **not** correct?
- A Both hydrogen and oxygen have a noble gas configuration of electrons.
 - B Each hydrogen shares its one electron with oxygen.
 - C Oxygen shares one of its own electrons with each hydrogen.
 - D Oxygen shares two of its own electrons with each hydrogen.

- 12 Element X has six electrons in its outer shell.



key

⊕ = electron

How could the element react?

- A by gaining two electrons to form a positive ion
 - B by losing six electrons to form a negative ion
 - C by sharing two electrons with two electrons from another element to form two covalent bonds
 - D by sharing two electrons with two electrons from another element to form four covalent bonds
- 13 Electrons from each element are shared by both of the elements in a compound.

Which compound matches this description?

- A lead bromide
- B sodium chloride
- C water
- D zinc oxide

14 In the molecules CH_4 , HCl and H_2O , which atoms use **all** of their outer shell electrons in bonding?

- A** C and Cl **B** C and H **C** Cl and H **D** H and O

15 Element X forms an acidic, covalent oxide.

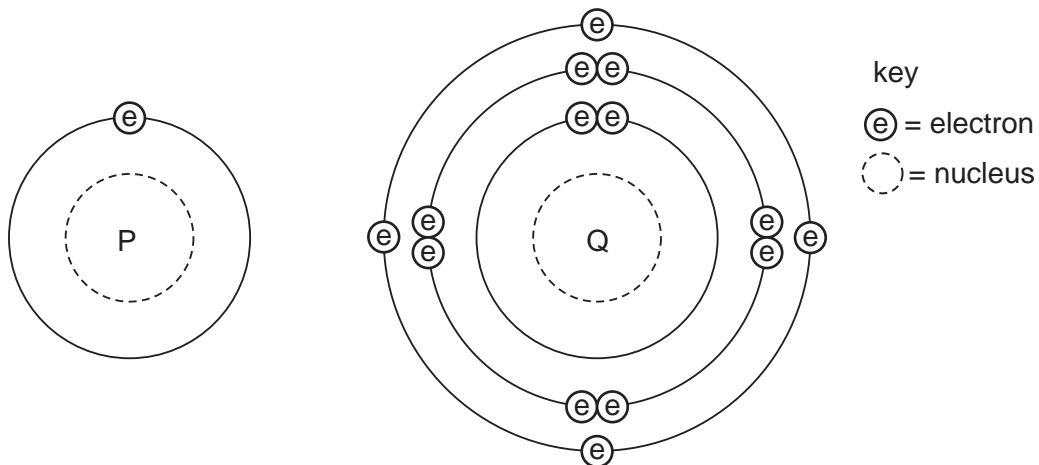
Which row shows how many electrons there could be in the outer shell of an atom of X?

	1	2	6	7
A	✓	✓	x	x
B	✓	x	✓	x
C	x	x	✓	✓
D	x	✓	x	✓

16 Which is a simple covalent molecule?

	conducts electricity		volatile
	when solid	when molten	
A	✓	✓	x
B	✓	x	✓
C	x	✓	x
D	x	x	✓

17 The diagram shows the electronic structures of atoms P and Q.



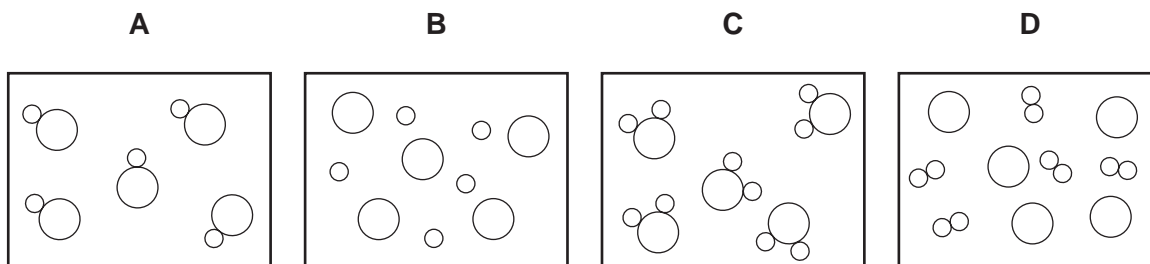
P and Q combine to form a molecule.

What is the formula of this molecule?

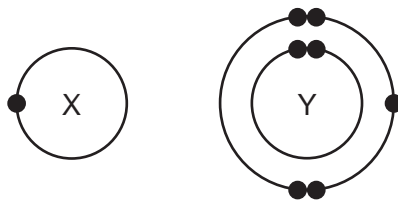
- A** PQ_4 **B** PQ **C** P_2Q **D** P_4Q

18 In the diagrams, circles of different sizes represent atoms of different elements.

Which diagram represents hydrogen chloride gas?



19 The electronic structures of atoms X and Y are shown.

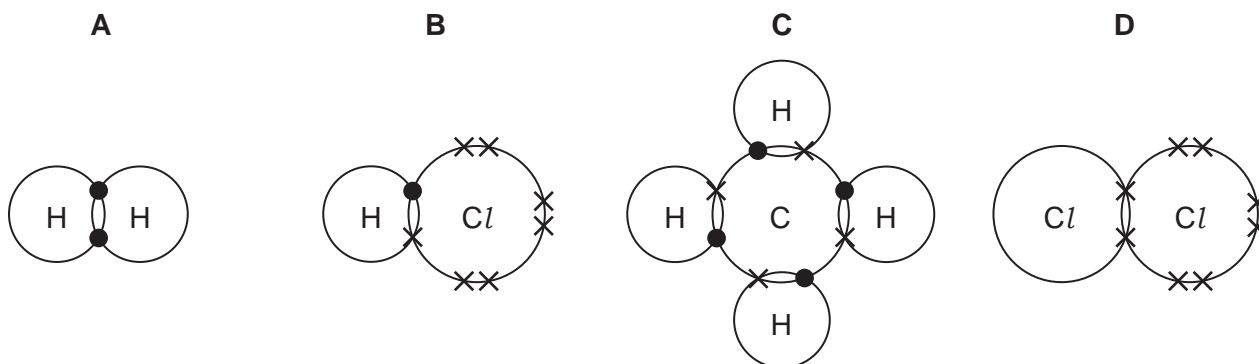


X and Y form a covalent compound.

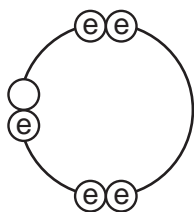
What is its formula?

- A** XY_5 **B** XY_3 **C** XY **D** X_3Y

20 Which diagram does **not** show the outer shell electrons in the molecule correctly?



21 Element X has six electrons in its outer shell.



key

⊕ = electron

How could the element react?

- A** by gaining two electrons to form a positive ion
B by losing six electrons to form a negative ion
C by sharing two electrons with two electrons from another element to form two covalent bonds
D by sharing two electrons with two electrons from another element to form four covalent bonds

22 In which compounds are pairs of electrons shared between atoms?

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2 methane

3 lead bromide

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B 2 only

C 1 and 3

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