Covalent structure and bonding: teacher guidance

These Knowledge check worksheets provide a series of questions to assess learners' knowledge and understanding of this topic at the end of a period of teaching or as revision. They are available at Foundation and Higher level and as fully editable versions so you can adapt them to suit learners' needs. Use for individual student work in class or at home. Find the full set of answers below.

Also available to assess this topic:

- **Review my learning worksheets**: available with three levels of scaffolded support to help build confidence in every learner. Use before, during or after teaching the relevant topic, to understand progress and identify misconceptions, **rsc.li/44igB7V**.
- **In context worksheets** ask learners to apply their knowledge to interesting contexts from everyday life, helping them develop their skills and prepare for examination, including calculation questions to practise mathematical skills within a genuine chemical context, **rsc.li/3VC8uR1**.

Answers

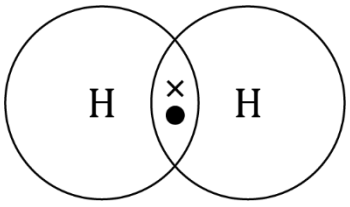
Foundation

1 (a) **B** compounds of non-metals only [1 mark]
C molecules of non-metals [1 mark]

(b) i. 2 [1 mark]
ii. 4 [1 mark]
iii. 6 [1 mark]

(c) **D** an electron [1 mark]

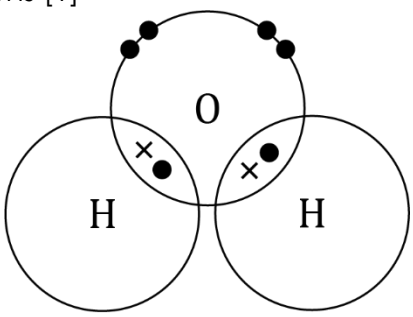
(d) i. Two electrons shared [1], correct overall number of electrons [1]



[2 marks]

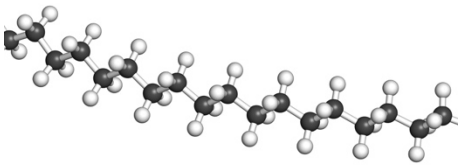
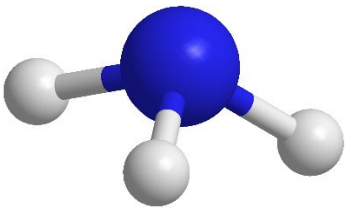
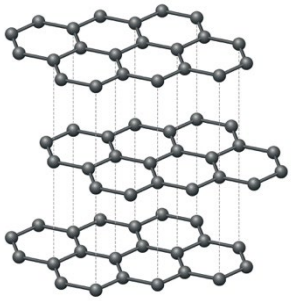
ii. H_2 [1 mark]

(e) One pair/two electrons shared in two OH bonds [1], correct overall number of electrons [1]



[2 marks]

2 (a)

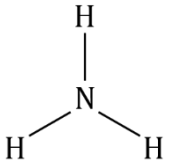
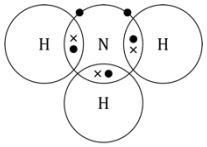
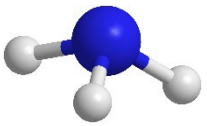
Substance	Diagram of structure	Type of structure
poly(ethene)		polymer
ammonia		simple molecule
graphite		giant covalent structure

[3 marks – 1 mark per correct row]

(b) strong[1]; weak[1]; intermolecular forces[1] [3 marks]

(c) stronger[1]; higher[1]; more[1] [3 marks]

3

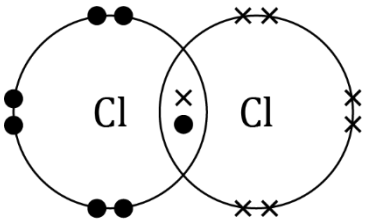
Does the representation show:	NH_3			
the types of atoms in the molecule?	✓	✓	✓	✓
the number of each type of atom?	✓	✓	✓	✓
how the electrons are shared?	×	×	✓	×
the 3-D structure?	×	×	×	✓

[4 marks – 1 mark per correct row]
[Total: 24 marks]

Higher

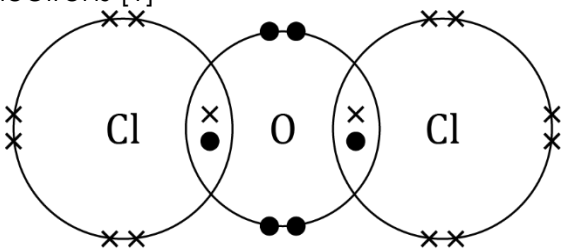
1 **B** compounds of non-metals only [1 mark]
C molecules of non-metals [1 mark]

2 (a) One pair/two electrons shared [1], correct overall number of electrons [1]



[2 marks]

(b) One pair/two electrons shared in two Cl – O bonds [1], correct overall number of electrons [1]



[3 marks]

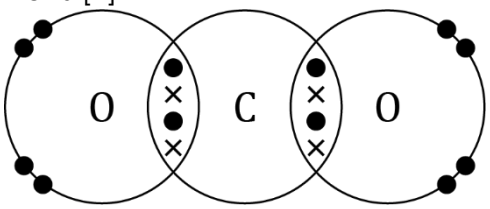
(c) i. Allow liquid or gas. [Note that the boiling point of Cl_2O is 2.2 °C] [1 mark]

ii. Cl_2O has a simple molecular structure [1] with weak intermolecular forces between its molecules [1]. These are easily overcome/do not take much energy to overcome [1]. [3 marks]

(d) Poly(chloroethene) is a polymer/has large molecules [1] with stronger intermolecular forces [1], which need more energy to overcome [1]. [3 marks]

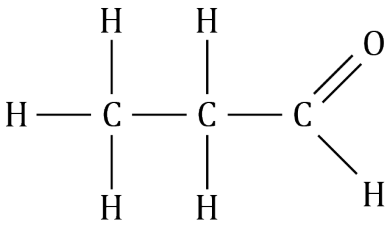
3 (a) 4 electrons [1 mark]

(b) Two pairs/four electrons shared in two CO bonds [1], correct overall number of electrons [1]



[2 marks]

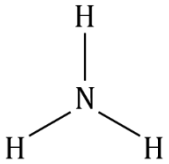
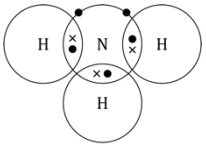
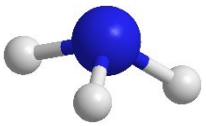
4 (a) Correct number and type of atoms in correct order [1], double and single bonds shown correctly [1]



[2 marks]

(b) C_2H_5CHO [allow any combination of C, H and O to give C_3H_6O] [1 mark]

(c)

Does the representation show:	NH_3			
the types of atoms in the molecule?	✓	✓	✓	✓
the number of each type of atom?	✓	✓	✓	✓
how the electrons are shared?	×	×	✓	×
the 3D structure?	×	×	×	✓

[4 marks – 1 mark for each correct row]

5 (a) X is giant covalent structure [1 mark]
Y is simple molecule [1 mark]
Z is polymer [1 mark]

(b) intermolecular forces [1 mark]

(c) Simple molecular covalent substances have no charged particles to carry the charge. [1 mark]

[Total: 29 marks]