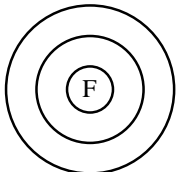
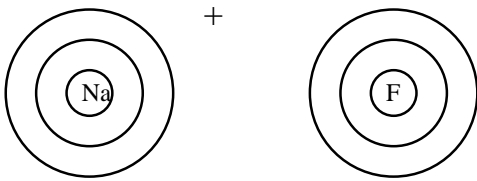


Structure and bonding

Mark scheme

1. (i) B or 2, 8, 1 for one mark 1
- (ii) A or 2, 8 for one mark 1
- [2]
2. (a) C₁₆ H₃₄ for one mark 1
- (b) electron gains one mark 2
- but shared electrons gains 2 marks
- [3]
3. (a) all electrons correct (inner shell need not be shown) 1
- three bond pairs and two electrons anywhere else can use dots, crosses or e's in any combination
- (b) covalent accept phonetic spelling; do **not** accept convalent 1
- [2]
4. (a) 2, 8, 8, 1 1
- for 1 mark
- (b) (i)  4
- for 1 mark
- Ignore symbol in middle but structure must be drawn NOT 2,7
- (ii)  (1) for charges
- (1) for each structure
- If covalent; can score mark for changes but not for diagram
Arrow showing electron transfer from metal atom to non-metal atom = 2 marks
If the ions are not identified then cannot score mark for changes
- [5]
5. (a) any (must be named) 1
- (b) F₂ 1
- (c) -/F- 1
- (d) (i) covalent 1
- (ii) made of molecules etc. type of bonding when non-metals react. 1
- [5]

6.	(a)	(i)	rings of 2, 8 and 3 electrons <i>credit 2, 8, 3 pay particular attention to the outer shell in diagrams</i>	1	
		(ii)	rings of 2, 8 and 7 electrons <i>credit 2, 8, 7 pay particular attention to the outer shell in diagrams</i>	1	
	(b)	(i)	<i>labels not required on atoms charges need to be shown on ions reference to outer shell is required otherwise a maximum of two marks structure of atoms/ions marks</i>		
			(ring of 2, 8, 1 for sodium) or the outer shell of sodium only contains 1 electron <i>credit 2, 8, 1 or an ion 2, 8 or two circles and 1 electron in outer shell</i>	1	
			(ring of 2, 6 for oxygen) or outer shell only contains 6 electrons <i>credit 2, 6 or an ion 2, 8 or two circles</i>	1	
			<i>transfer of electrons mark</i>		
			two sodiums needed to supply two outer electrons to oxygen to complete the (one oxygen's) outer shell <i>award maximum of two marks if a covalent structure is given credit two rings of electrons for sodium showing outer electrons transferring to outer shell of one oxygen for three marks do not accept diagrams showing overlapping rings for third mark</i>	1	
		(ii)	loses an electron <i>credit atoms lose electrons or oxygen takes the electron ignore oil rig</i>	1	[6]
7.	(a)	X – (metal) atom / ion		1	
		Y – electron		1	
	(b)	free electrons or electrons move (allow metal) atoms / ions to slide over each other		1	
		OR bonding non - directional for 2 marks			[4]
8.	answers apply to: (<i>accept diagrams and/or descriptions</i>)				
		• carbon dioxide CO ₂			
		• ammonia NH ₃			
		• methane CH ₄			
		• water H ₂ O			
		*outer electronic structure of one atom correct or needs correct number of electrons to complete outer shell		1	
		*outer electronic structure of other atom correct or needs correct number of electrons to complete outer shell		1	
		*one shared pair of electrons (as one covalent bond) <i>use of ions or reference to ionic bonding negates this mark</i>		1	
		*outer electronic structure of compound correct or each atom now has a full outer shell/noble gas electron structure		1	[4]