Structure and Bonding Fundamentals

1 Complete the table to show the formula and structure type (use ✓s) of the following substances. (10)

Substance	Formula	Monatomic	Simple molecular	Giant covalent	Ionic	Metallic
silver(I) nitrate						
bromine						
potassium bromide						
calcium						
aluminium sulfate						
argon						
ammonia						
ammonium chloride						
hydrogen sulfide						
graphene						

Complete the table to show the formula and structure type (use ✓s) of the following substances. (8)

Substance	Formula	Monatomic	Simple molecular	Giant covalent	Ionic	Metallic
ammonia						
iodine						
lithium bromide						
potassium						
aluminium hydroxide						
diamond						
buckminsterfullerene						
helium						

Complete the table using ✓s to show which type of structure the following substances have. (8)

Substance	Monatomic	Simple molecular	Giant covalent	Ionic	Metallic
helium (He)					
nitrogen fluoride (NF_3)					
silicon chloride ($SiCl_4$)					
strontium chloride ($SrCl_2$)					
iron oxide (Fe_2O_3)					
phosphorus (P_4)					
silicon dioxide (SiO_2)					
iridium (Ir)					

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3 Give the formula of each of the following ionic substances. (8)

a) potassium bromide ..... e) cobalt(II) carbonate .....

b) aluminium sulfide ..... f) ammonium nitrate .....

c) magnesium hydroxide ..... g) titanium(IV) oxide .....

d) iron(III) nitrate ..... h) rubidium sulfate .....

4 Draw stick diagrams and dot-cross diagrams for each of these molecules. (8)

	NH_3	CO_2	HBr	N_2
stick diagram				
dot-cross diagram				

11 Write a balanced equation for each of these reactions. (6)

a) calcium + water

.....

b) ethanethiol (C_2H_5SH) + oxygen

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c) zinc + hydrochloric acid

.....

d) potassium carbonate + nitric acid

.....

e) ammonia + sulfuric acid

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f) copper(II) oxide + nitric acid

.....

Write a balanced equation for each of these reactions. (8)

a) copper(II) carbonate + nitric acid

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b) magnesium oxide + hydrochloric acid

.....

c) silane (SiH_4) + oxygen

.....

d) calcium + hydrochloric acid

.....

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Write a balanced equation for each of these reactions. (10)

a) potassium oxide + hydrochloric acid

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b) barium + water

.....

c) propane (C_3H_8) + oxygen

.....

d) magnesium + nitric acid

.....

e) zinc(II) carbonate + sulfuric acid

.....

5 Describe what each of the following formulae tells you about the substance shown.

a) Ammonia has the molecular formula NH_3 .....

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..... (2)

b) Silicon dioxide has the formula SiO_2 .....

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..... (2)

c) Aluminium oxide has the formula Al_2O_3. .....

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..... (2)

d) Sulfur has the molecular formula S_8. .....

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..... (2)

Structure and Bonding Fundamentals

12 Explain each of the following.

a) Magnesium chloride has a high melting point. .....

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..... (3)

b) Copper conducts electricity. .....

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..... (3)

c) Methane has a low boiling point. .....

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..... (3)

The element carbon exists in several different forms (allotropes), including diamond, graphite and graphene.

a) Explain why these forms of carbon all have high melting points.

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..... (3)

b) Explain why graphite and graphene are electrical conductors but diamond is not.

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c) .....

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..... (3)

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..... (2)