1 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						

2 Convert these quantities into the units shown.

a) 25 cm^3 to dm^3 …… (1)

b) 500 cm^3 to m^3 …… (1)

c) 100 kPa to Pa …… (1)

d) 89 mg to g …… (1)

e) –196°C to K …… (1)

f) 0.102 nm to m …… (1)

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

a) copper(II) carbonate + nitric acid

……

b) magnesium oxide + hydrochloric acid

……

c) silane (SiH_4) + oxygen

……

d) calcium + hydrochloric acid

……

4 Write an ionic equation for each of these reactions. (6)

a) precipitation of lead(II) iodide when solutions of potassium iodide and lead(II) nitrate are mixed

……

b) acid-base reaction between sulfuric acid and lithium hydroxide

……

c) redox reaction between solution of iron(II) nitrate and zinc metal

……

5 Complete the table about these atoms and ions. (2)

atom / ion	atomic number	mass number	protons	neutrons	electrons
$^{31}_{15}P^{3-}$					
			35	46	36

6 Which is the limiting reagent and what mass of lithium oxide is formed when 1.0 g of lithium is heated with 1.3 g of oxygen?

$$4Li(s) + O_2(g) \rightarrow 2Li_2O(s)$$

……

……

……

……

…… (4)

7 Calculate the percentage atom economy to form chlorine in this reaction.

$$2NaCl + 2H_2O \rightarrow Cl_2 + H_2 + 2NaOH$$

……

……

……

……

…… (2)

8 Calculate the mass of one atom of $^{7}_{3}Li$. (Avogadro constant, L = 6.022 x 10^{23} mol^{-1})

……

……

……

…… (1)

9 In a reaction, 115 g of tungsten was formed from 200 g of tungsten oxide. Calculate the percentage yield.

$$WO_3 + 3H_2 \rightarrow W + 3H_2O$$

……

……

……

……

……

……

……

…… (4)

10 In a titration, it was found that 25.00 cm^3 of 0.100 mol dm^{-3} sodium hydroxide reacts with 26.38 cm^3 of nitric acid. Calculate the concentration of the nitric acid solution in mol dm^{-3}.

$$HNO_3(aq) + NaOH(aq) \rightarrow NaNO_3(aq) + H_2O(l)$$

……

……

……

……

……

……

……

…… (3)

11 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				

12 Explain each of the following.

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

……

……

……

…… (3)

b) Copper conducts electricity. ……

……

……

……

…… (3)

c) Methane has a low boiling point. ……

……

……

……

…… (3)

d) Aluminium oxide conducts electricity when molten but not as a solid. ……

……

……

……

…… (3)

e) Helium has a very low boiling point. ……

……

……

……

…… (3)

Area	Strength	To develop	Area	Strength	To develop	Area	Strength	To develop
Done with care and thoroughness			Write formulae (ionic)			Can do solution calculations		
Good SPG			Write formulae (other)			Can find % atom economy		
Shows full working			Write balanced equations			Can find % yield		
Explanations are clear			Write ionic equations			Can work out PNE numbers in atoms/Ions		
Convert units			Identify structure type of substances			Can draw stick diagrams		
Work to appropriate sig figs			Understands Avogadro constant			Can draw dot-cross diagrams		
Gives units when appropriate			Can work out formula mass			Good understand of structure & bonding		
			Find moles from mass (and vice versa)			Use of terms: atoms / molecules / ions / e^-		
			Can do reacting mass calculations			Use of terms: bonds / forces		
			Understands limiting reagents					