

## A level Chemistry Bridging Project

Answer all the questions in as much detail as you can – you will need to research the answers to some of the questions.

- Make sure you set out your answers in an organised way
- Where calculations are involved, you must show your working
- A periodic table is provided for your use at the end of this document
- Do not give up because you find one question too hard – move on and come back to it, but make sure you try every question/task, this is what A level Chemistry is about - it's hard graft in some bits and no parts can be missed because you find it hard in the first instance
- Use whatever resources you can; people - peers and adults, books and the internet
- Don't forget that you can ask for help if you need it

1) Copy and complete the following table:

Particle	Relative Mass	Relative Charge
Proton		
Neutron		
Electron		

2) What is the charge on the ion formed when an atom loses two electrons?

3) What is the charge on the ion formed when an atom gains two electrons?

4) Copy and complete the following table:

Element	Symbol	Z	A	No. of Protons	No. of Neutrons	No. of Electrons
Sodium			23			
		6	12			
		12			12	
		84	210			
Chlorine		17	35			
		17	37			

5) In terms of the numbers of sub atomic particles, state one difference and two similarities between two isotopes of the same element.

6) What is the average mass number of a sample of Argon which comprises of 16 atoms of Argon-40 for every 3 atoms of Argon-39? Write your answer to 2 decimal places.

7) Draw a diagram to show the electron arrangement of a sodium atom.

8) Draw a table to show which of the following elements are from the S Block and which are from the P Block:

caesium, potassium, phosphorus, calcium, aluminium, barium, lead and sulphur

9) Draw a dot and cross diagram to show the rearrangement of electrons in the formation of each the following ionic compounds:

- magnesium oxide
- potassium chloride

10) Draw dot and cross diagrams to show the electron sharing in the following covalent compounds:

- Ammonia, NH<sub>3</sub>
- Oxygen, O<sub>2</sub>
- Ethane, C<sub>2</sub>H<sub>6</sub>

11) What charge will each of the following elements form in ionic compounds?

- Aluminium
- Barium
- Rubidium
- Phosphorus
- Bromine
- Sulfur
- Strontium

12) Copy and complete the following table for the family of hydrocarbons called the alkanes;

Name	Molecular Formula	Displayed or Structural Formula	Boiling Point (°C)
Methane			
Ethane			
	C <sub>3</sub> H <sub>8</sub>		
Butane			
	C <sub>5</sub> H <sub>12</sub>		

13) Describe the trend in boiling point for the alkanes as the chain length increases.

14) Explain the trend in boiling points for the alkanes as the chain length increases.

15) Copy and complete the following table:

Structure	Examples	General Properties
Ionic	i) ii) iii) iv)	
Simple Covalent	i) ii) iii) iv)	
Giant Covalent	i) ii) iii) iv)	
Metallic	i) ii) iii) iv)	

16) Which property allows the fractions of crude oil to be separated?

17) What is the relationship between chain length and the temperature at which a hydrocarbon condenses?

18) Write fully balanced chemical equations for the complete combustion of the following:

- Methane
- Ethene
- Butane

- 19) What is the general formula for alkanes?
- 20) What substances are produced in the incomplete combustion of alkanes?
- 21) Draw the displayed formulae of But-1-ene and But-2-ene and explain why they are different.
- 22) Write an equation to show the formation of poly(propene) from propene.
- 23) Write the formulae for the following ionic compounds:
- Silver carbonate
  - Iron (II) hydroxide
  - Ammonium sulphate
- 24) Write fully balanced chemical equations with state symbols for the following reactions:
- aluminium + nitric acid
  - potassium hydroxide + sulphuric acid
  - aluminium oxide + sulphuric acid
  - calcium carbonate + hydrochloric acid
- 25) Calculate the empirical formula of the oxide of lead which contains 6.47g of Lead to every 1g of oxygen.
- 26) Calculate the molecular formula of a hydrocarbon which has a relative molecular mass of 78 and contains 92.3% carbon.
- 27) Water has an unusually high boiling point given that it is a simple covalent compound (these are normally gases) yet it is a liquid at room temperature. It is also unusual in that it becomes less dense as it freezes – solid ice floats on liquid water. Explain these two anomalies with reference to hydrogen bonding. Your answer should include:
- an explanation of what hydrogen bonding is
  - diagrams to help your explanation
  - why it has an unusually high boiling point, and
  - why it becomes less dense when it at freezing point