Revision Unit 1

1) Water is boiled in a kettle. Describe the bonds that are broken or created during this activity. Draw a diagram to assist in your explanation.

2) Carbon dioxide has a molar mass of 44 g/mol while ethanol has a molar mass of 46 g/mol. Although the two molecules are very similar in size they differ greatly in their physical properties. Ethanol is a liquid at room temperature and has a boiling temperature of around 80 ^{o}C while carbon dioxide is a gas at room temperature and boils at around -80 ^{o}C. Explain why.

3) The following table provides information about the physical properties of 5 substances.

Substance	Melting Point (ºC)	Boiling Point (ºC)	Conduct electricity in solid form?	Conduct electricity in liquid form?
A	12	120	No	No
B	800	1200	No	Yes
C	700	1500	yes	Yes
D	145	200	No	No
E	–95	–12	No	No

   i. Which substance is most likely a metal? Explain
   ii. Which substance is very brittle? Explain
   iii. Which substances are likely to be molecular substances? Explain
   iv. One of the substances is known to be composed of non-polar molecules. Which is the likely substance? Give a reason for your answer.

4) Consider the following substances. CH_3F, CH_3OH, CO_2, CH_3COOH.
   i. What is the intra-molecular bonding in all of these molecules?
   ii. Which molecules have inter molecular forces composed of dispersion forces only?
   iii. Which molecules have a high degree of solubility in water? Explain

5) Complete the table below.

Molecule	Electron dot diagram	Molecular shape
CO_2		
CF_4		
NH_3		
H_2S		

ii. Explain how the octet rule is used to draw electron dot diagrams?

3) A substance is composed of three isotopes listed below along with their percentage abundance. Calculate the relative atomic mass of the element.

Isotope	Relative Isotopic Mass	Abundance (%)
35	34.98	45.0
32	31.96	15.0
31	31.01	40.0

4) Write the electronic configuration of the following species.

i. K^+

ii. Fe^{2+}

iii. Cr

iv. Which element does this excited cation with a 2+ charge and the electronic configuration shown below belong to?
$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^4$