Higher Chemistry: Unit 1 – CCS Part Bii HOMEWORK 3

The answers (and questions) to Homework 3 are below. You should now mark your answers and review any errors. A 10 minutes screencast of the answers with full explanation can be found in this link – ANSWERS TO HOMEWORK 3 WITH EXPLANANTIONS

All higher chemistry homeworks are out of 20 so you can grade your own progress:

16 or above = **A**

13-15 = **B**

10-12 = **C**

If you score below 10, you should take some time to read and watch these lessons again. If you are still unsure of where you are going wrong, you should ask in the questions channel on MS Teams

Answers to Homework 3

1. C
2. D
3. D
4. C
5. B
6. A
7. B
8. B
9. D

Question		Expected Response	Max Mark	Addition Guidance
10	(a)	Hydrogen bonding	**1**	
	(b)	Due to the large difference in electronegativity between the nitrogen and hydrogen atoms.	**1**	
11	(a)	Cl_2= -34°C AND Ar = -186°C	**1**	Both required for mark
	(b)	- Correctly identify that the forces are stronger between chlorine (molecules) than between the argon (atoms) **(1 mark)** - Correctly identifying that there are London dispersion forces between (the molecules /atoms/ particles) of both these elements **(1 mark)** - These forces are stronger due chlorine molecules having a larger number of electrons than argon atoms. **(1 mark)**	**3**	
12	(a)	Permanent dipole to permanent dipole interactions		

	(b)	Due to the difference in electronegativity between the sulfur and hydrogen atoms.		
13		Open ended question: No understanding = 0 marks Limited understanding = 1 marks Reasonable understanding = 2 marks Good understanding = 3 marks Suggestions: - Bonding and type of structure of each compound - Mention/comparison of polarity of each compound - Bonding/structure polarity or water & hexane - Like dissolved like - Mention of how spatial arrangement of $SiCl_4$ leads to it being non-polar		
		Total =	**20**	

Homework 3 – Properties of Bonding

1. Which type of bonding is never found in elements?

A Metallic
B London dispersion forces
C Polar covalent
D Non-polar covalent

2. Which of the following chlorides is most likely to be soluble in tetrachloromethane, CCl_4?

A Barium chloride
B Caesium chloride
C Calcium chloride
D Phosphorus chloride

3. Element X was found to have the following properties.

(i) It does not conduct electricity when solid.
(ii) It forms a gaseous oxide.
(iii) It is a solid at room temperature.

Element X could be

A magnesium
B silicon
C nitrogen
D sulfur.

4. An element (melting point above 3000°C) forms an oxide which is a gas at room temperature. Which type of bonding is likely to be present in the element?

A Metallic
B Polar covalent
C Non polar covalent
D Ionic

5. At room temperature, a solid substance was shown to have a lattice consisting of positively charged ions and delocalised outer electrons. The substance could be:

A Graphite
B Sodium
C Mercury
D Phosphorus

6. Which property of a chloride would prove that it contained ionic bonding?

A It conducts electricity when molten.
B It is soluble in a polar solvent.
C It is a solid at room temperature.
D It has a high boiling point.

7. Which of the following does not contain covalent bonds?

A Hydrogen gas
B Helium gas
C Nitrogen gas
D Solid sulfur

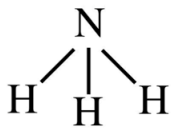
8. Which of the following structures is never found in compounds?

A Ionic
B Monatomic
C Covalent network
D Covalent molecular

9. Which line in the table represents the solid in which only London dispersion forces are overcome when the substance melts?

	Melting Point / °C	Electrical conduction in solid state
A	714	non-conductor
B	98	conductor
C	660	conductor
D	44	non-conductor

10. Compared to other gases made up of molecules of similar molecular masses, ammonia has a relatively high boiling point.



(a) What type of Van der Waals forces causes ammonia to have such a high boiling point? **(1)**

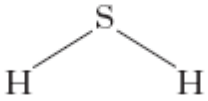
(b) How does this type of intermolecular bonding arise in ammonia? **(1)**

11. Chlorine and argon are beside one another on the periodic table and are both gases at room temperature.

(a) Find the boiling point of chlorine and argon. **(1)**

(b) Explain fully, in terms of structure and the type of van der Waals forces present, why the boiling point of chlorine is higher than that of argon. **(3)**

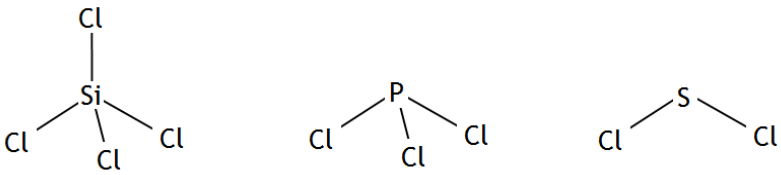
12. Hydrogen sulfide has a boiling point of −60 °C.



(a) What type of Van der Waals forces causes hydrogen sulfide to have a higher boiling point than chlorine. **(1)**

(b) How does this type of intermolecular bonding arise in hydrogen sulfide **(1)**

13. The structures of three chlorides are shown. Maryam investigated the solubility of the compounds in hexane and in water.



Using your knowledge of chemistry, comment on the solubility of these chlorides in water and in hexane. **(3)**

Total = 20