Year 13 Chemistry Worksheet 4

Day 1

Q1 According to Hund's rule, the orbital electron arrangement for the Nitrogen atom is

A. ↑↓ ↑ ↑↓ ↑ ↑
B. ↑ ↑ ↑↓ ↑↓ ↑
C. ↑↓ ↑↓ ↓ ↑ ↑
D. ↑↓ ↑↓ ↑ ↑ ↑

Q2 The two species represented below have chlorine atoms attached to the central atom.

$GeCl_4$	$SnCl_2$

(a) Draw the Lewis structure of each of the two species. Show all valence electrons in your structures. **(2 marks)**

(b) On the basis of the Lewis structure that you have drawn in part (a) above, answer the following questions about the particular species indicated.

(i) What is the *Cl*-Ge-*Cl* bond angle in $GeCl_4$? **(½ mark)**
(ii) Predict the shape formed by the atoms in $SnCl_2$ **(½ mark)**

Q3 Explain the polarity of the $SeCl_4$ molecule. **(2 marks)**

Day 2

Q1 The element chlorine *Cl*, which has an approximate relative atomic mass of 35.5 consists **mainly** of

A. isotopes of ^{35}Cl and ^{37}Cl in the ratio 2:1
B. isotopes of ^{35}Cl and ^{37}Cl in the ratio 1:2
C. isotopes of ^{35}Cl and ^{37}Cl in the ratio 1:3
D. isotopes of ^{35}Cl and ^{37}Cl in the ratio 3:1

Q2 A solution was prepared by mixing 50g of glucose $C_6H_{12}O_6$ in 500g of water.
[M_r ($C_6H_{12}O_6$) = 180, M_r (H_2O) = 18]

(a) Calculate the mole fraction of glucose in the solution. **(2 marks)**

(b) What is the molality of the glucose solution ? **(1 mark)**

Q3 Classify the following as intermolecular or intramolecular forces. Explain your answer.

(i) covalent bond
(ii) van der Waal's interactions
(iii) hydrogen bond **(3 marks)**

Day 3

Q1 Which of the following compounds will contain the **greatest** number of ions when a 10g sample of it is dissolved in water ?
[Ar: Li=7, F=19, Na=23, K=39, Cl=35.5, Ca=40]

A. LiF
B. NaF
C. KF
D. $CaCl_2$

Q2 Suggest a reason why the first ionization energy of boron is lower than that of beryllium while the reverse is true of their second ionization energies. **(2 marks)**

Q3 Define **saturated vapour pressure** of water. **(1 mark)**

Day 4

Q1 Which of the following molecules is non-polar ?

A. CO_2
B. H_2S
C. PH_3
D. HI

Q2 Write the electron configuration of Cu using the *spd* notation. **(1 mark)**

Q3 Account for the larger electron affinity of silicon as compared to phosphorous. **(1 mark)**

Day 5

Q1 Equal molar quantities of hydrogen gas and oxygen gas are present in a closed container at a constant temperature. Which of the following quantities will be the same for the two gases ?

I Partial pressure
II Average kinetic energy
III Average molecular velocity

A. I only
B. I and II only
C. I and III only
D. II and III only

Q2 Freshly made plastic sulphur is an elastic substance because it

A. is a molecular solid.
B. consists of single atoms.
C. has very weak bonds between sulphur atoms.
D. consists of short interwoven chains of sulphur atoms.

Q3 The factors which favour strong forces in the ionic crystal are

A. big size and small charge of an ion.
B. small size and high charge of an ion.
C. big size and the same number of ions.
D. small size and the same number of ions.