Section A [15 marks]

Answer all questions in this section. ***Write your answer in the space provided at Page 4***

1. What is the unit of the Avogadro's constant ?
   A. particle mol^{-1}
   B. Mol^{-1}
   C. Grams
   D. Mol dm^{-3}

2. Each molecule of haemoglobin contains 4 iron atoms. If the percentage by mass of iron in haemoglobin is 0.33%, what is the relative molecular mass of haemoglobin ?
   A. 3.4×10^2
   B. 1.7×10^5
   C. 6.8×10^4
   D. 6.8×10^6

3. Which of the following statements is regarding isotopes ?
   A. They are elements in the same group in the periodic table.
   B. They are atoms with the same number of protons and neutrons
   C. They occupy the same position in the periodic table
   D. They have the same mass

4. Which of the following contains the largest number of hydrogen atoms ?
   A. 3.8 mol of NH_3
   B. 24 dm^3 of H_2 at room conditions
   C. 98 g of H_2O
   D. 100 g of CH_4

5. When 70cm^3 of water is added to 50cm^3 of an aqueous solution sulphate, Na_2SO_4, the resulting solution has a concentration of 0.50 mol dm^{-3}, what is the original concentration of the sodium sulphate solution ?
   A. 0.35 mol dm^{-3}
   B. 1.20 mol dm^{-3}
   C. 0.50 mol dm^{-3}
   D. 2.40 mol dm^{-3}

6. What kind of orbital must an electron with the principle quantum number n= 3 occupy ?
   A. An *s*-orbital
   B. A *d*-orbital
   C. A *p*-orbital
   D. Either one of the above

7. An orbital always contains
   A. 0, 1 or 2 electrons
   B. 1 or 2 electrons
   C. 2 electrons
   D. 8 electrons

8. When an electrons 'drops' from a higher energy level to a lower energy level, light is emitted . Which of the following transition of electron emits light with the shortest wavelength ?
   A. n = 2 to n = 1
   B. n = 6 to n = 3
   C. n = 3 to n = 1
   D. n = 9 to n = 2

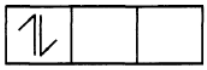
9. The proton number for species X is 8 and its nucleon number is 18. Species X has two electrons less than the number of neutron. What is the charge on X ?
   A. 0 B. -1 C. +1 D. +2

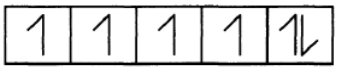
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10. Which orbital diagram shows the filling of electron(s) based on Hund's rule ?

A 

C 

B 

D 

11. An atom M has seven valence electrons and forms a stable M^{2+} ion in an aqueous solution. What is the electronic configuration of atom M ?

A. $1s^2 2s^2 2p^6 3s^2 3p^6$
C. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$
B. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^2$
D. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7 4s^2$

12. Which compound has an ionic bond ?

A. HCl
C. $AlBr_3$
B. $BeCl_2$
D. $C_6H_5NH_3Br$

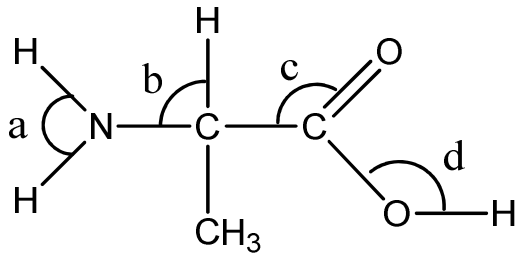
13. Which statement is **not** true about *s* , *p* and *d* orbitals ?

A. Three 2*p* orbitals have the same shape and energy
B. The size of 1*s* orbital is smaller than that of 2*p* orbitals
C. 2*s* orbital is non-directional whereas $2p_x$ orbital is directional
D. Vacant 3*d* orbitals are at a lower energy level than a vacant 4*s* orbital

14. Which compound has the strongest ionic bond ?

A. NaBr
C. AlF_3
B. $MgCl_2$
D. KI

15. The molecular structure of an amino acid, alanine, is given below



Which of the following are the correct angle for a, b, c and d.

angle	a	b	c	d
A.	120	90	120	180
B.	109	120	90	107
C.	120	109	120	104
D.	107	109	120	104

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PUSAT TINGKATAN ENAM MOD (II), SMK TAMAN JOHOR JAYA 1

UJIAN PENILAIAN PRA-PENTAKSIRAN (1) SEM 1 2016

SUBJECT : CHEMISTRY

Name : _____ Tingkatan : LOWER 6 _____

Section A [15 marks]

1		**6**		**11**	
2		**7**		**12**	
3		**8**		**13**	
4		**9**		**14**	
5		**10**		**15**	

Section B [15 marks]

Answer all questions in this section.

16. Mass spectrometry can be used for elements or compounds.

(a) Naturally occurring silicon has three isotopes, ^{28}Si , ^{29}Si and ^{30}Si in the relative abundance of 29.8 : 1.5 : 1.0

(i) Sketch and label the mass spectrum of silicon [2 marks]



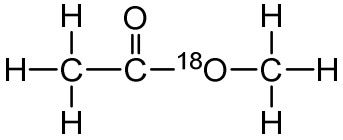
(ii) Calculate the relative atomic mass of silicon [2 marks]

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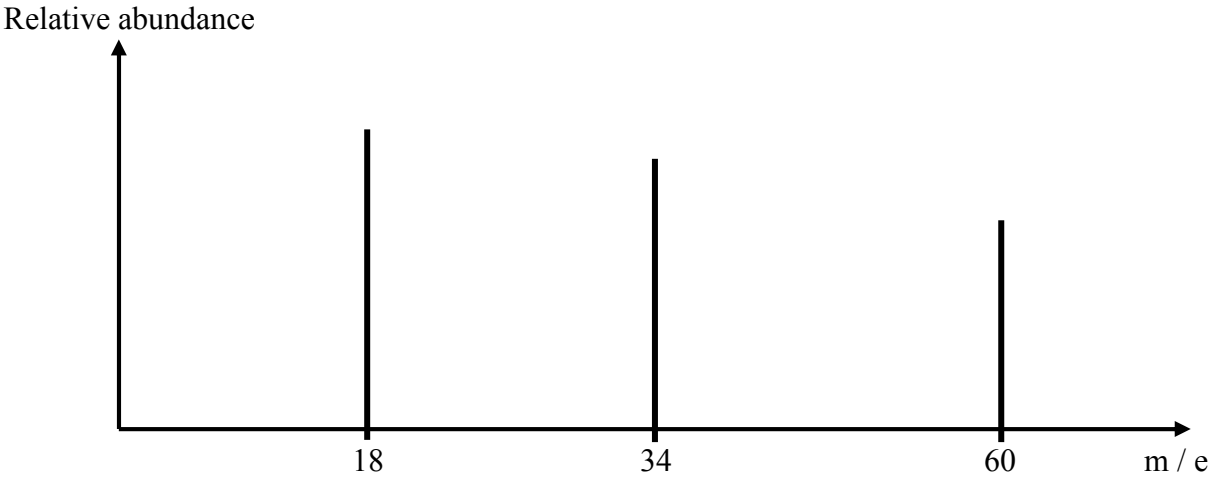
(b) Methyl ethanoate, CH_3COOCH_3 is an ester. This ester can be hydrolysed to produce methanol, CH_3OH and ethanoic acid, CH_3COOH, according to the equation below :

$$CH_3COOCH_3 + H_2O \rightarrow CH_3COOH + CH_3OH$$

In a study to determine which bond is broken during hydrolysis, an isotopically labeled ester is hydrolysed in dilute sulphuric acid. The structural formula of the ester is shown with ^{18}O isotope shown and the two possible bonds broken during hydrolysis.



After purification, the products of hydrolysis are then analysed in a mass spectrometer. Three of the major peaks are shown below. (not to scale)



(i) Identify the species responsible for the three peaks [2 marks]

……

……

……

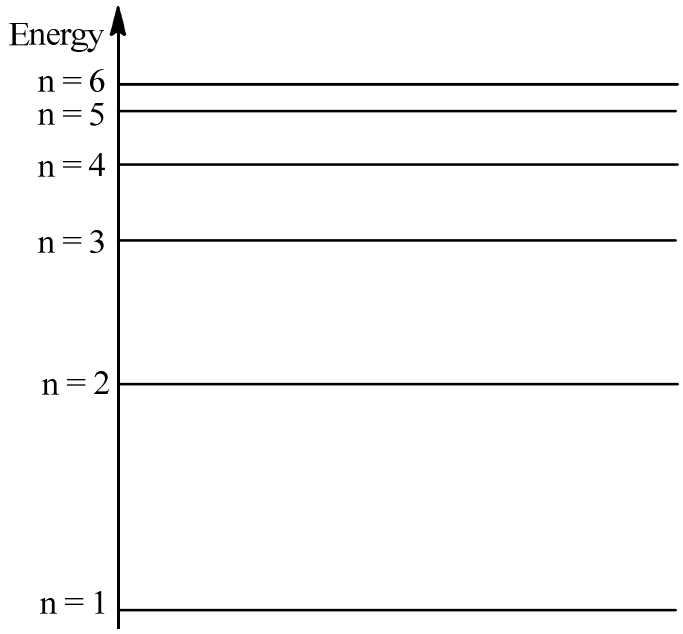
(ii) Deduce which of the two C — O bonds in the ester are broken during hydrolysis.

[1 mark]

……

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17. (a) (i) In the energy level diagram below , show the transition s that give rise to the second line in the Lyman series (label as I) and the third line in the Balmer series (label as II)



[2 marks]

(ii) The 3rd line in the Balmer series has a wavelength of 480 nm. Calculate the difference in energy (in kJ mol^{-1}) between the two energy level involved.
[Velocity of light, c = 3.0 x 10^{8} ms^{-1}. The Plank's constant, h = 6.63 x 10^{-34} Js. The Avogadro's constant, L = 6.02 x 10^{23} mol^{-1}] [3 marks]

(b) Explain the following observations :

(i) An orbital can allocate a maximum of only two electrons with opposite spins. [1 mark]

……

(ii) The valance electronic configuration of chromium is $3d^{5}4s^{1}$ instead of $3d^{4}4s^{2}$. [1 mark]

……

……

(iii) State Hund's rule. [1 mark]

……

……

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20. (a) Sodium and aluminium can react with chlorine to form different chloride based compound

(i) Using Lewis diagram, draw the structure of sodium chloride and aluminium trichloride [2 marks]

(ii) Based on the structure of drawn in (i), explain the melting point and conductivities of sodium chloride. [4 marks]

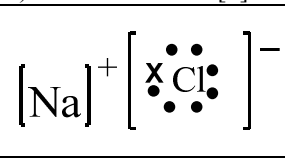
(iii) **"In room condition, the molecular mass of aluminium chloride is 267. However, when heated to 800^0C, its molecular mass had decreased to 133"**

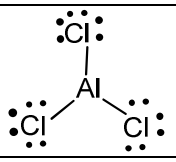
Explain the statement above [3 marks]

(b) Using the concepts of hybridisation and overlapping of orbitals, describe the bonding in the ethene, C_2H_4 [6 marks]

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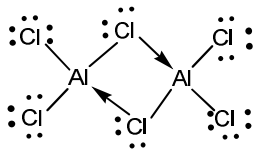
20 a) i. each structure [1] x 2 [2]





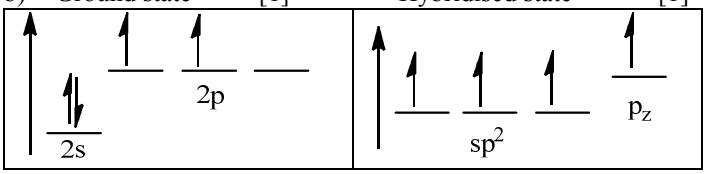
ii. - NaCl consist of ionic bond [1]
- hold by giant ionic crystal lattice [1]
- which give NaCl a high melting point [1]
- but made solid NaCl an insulator of electricity [1]

iii. - at room temperature, aluminium chloride exist as dimer [1]
- Structure of dimer [1]

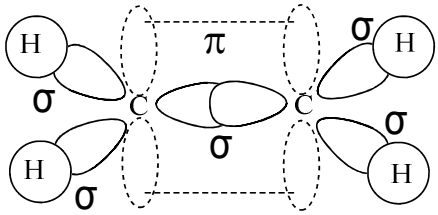


- when heated, Al_2Cl_6 dissociate / decomposed to $AlCl_3$ [1]

b) - Ground state [1] - Hybridised state [1]



- overlapping orbital diagram [1]
- labelled π-bond and σ-bond [1]
- shape : trigonal planar [1]
- angle of bond pair electron repulsion = 120° [1]



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Suka sampel ini?

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- Blueprint 30 hari Semester 1 (setiap subjek)
- Semester 3: percubaan 2024, 10 subjek, banyak negeri, soalan + skema dalam satu fail

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