

Topic 4

STANDARD Level



Summer & Winter Papers Summer 1999 to Summer 2013

Name: _____

Topic Exam Statistics (Paper 2):

Section	Marks	% of All Marks	Last four exams marks	Last four exams %
A	56/810	7%	/120	%
B	249/1620	15%	/240	%
TOTAL	305/2430	13%	/360	%

Total number of papers represented here is 27, each with 30 marks of Section A and 60 marks of section B (3 questions from which you chose to answer only 1)

IB SL 4 EQ Paper 2 s99 to s13 incl W

SL SECTION A 12wQ1

- (b) Although the molar masses of ICl and Br₂ are very similar, the boiling point of ICl is 97.4 °C and that of Br₂ is 58.8 °C. Explain the difference in these boiling points in terms of the intermolecular forces present in each liquid.

[2]

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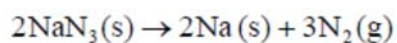
SL SECTION A 11w

1. Airbags are an important safety feature in vehicles. Sodium azide, potassium nitrate and silicon dioxide have been used in one design of airbag.



[Source: www.hilalairbag.net]

Sodium azide, a toxic compound, undergoes the following decomposition reaction under certain conditions.



Two students looked at data in a simulated computer-based experiment to determine the volume of nitrogen generated in an airbag.

- (a) Sodium azide involves ionic bonding, and metallic bonding is present in sodium. Describe ionic and metallic bonding. [2]

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- (d) Describe the bonding in iron and explain the electrical conductivity and malleability of the metal. [4]

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SL SECTION A 09w

2. PF_3 , SF_2 and SiF_4 have different shapes. Draw their Lewis structures and use the VSEPR theory to predict the name of the shape of each molecule. [6]

	PF_3	SF_2	SiF_4
Lewis structure			
Name of shape

SL SECTION A 09s

3. Sodium oxide, Na_2O , is a white solid with a high melting point.

- (a) Explain why solid sodium oxide is a non-conductor of electricity. [1]

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SL SECTION A 08w

3. (a) Three types of covalent bond (single, double and triple) are present in the molecules in the following equation.



- (i) Identify **one** bond in these molecules that is correctly described by the following. [4]

A polar single bond

A polar double bond

A non-polar double bond

A non-polar triple bond

- (ii) Identify the shortest bond in these molecules. [1]

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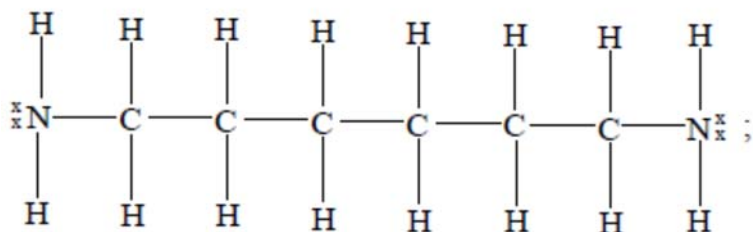
- (c) Complete the table to show the Lewis structure of each ion and the name of the shape of each ion.

	NH_4^+	H_3O^+
Lewis structure		
Name of shape		

[4]

SL SECTION A 06wQ1

This is molecule a and is used in the question that follows



- (ii) Use the VSEPR theory to predict the C–C–N bond angle in **A** and identify the shape of the distribution of electron pairs around the carbon atoms. [2]

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- (c) Identify the strongest type of intermolecular force in **A** and explain how it arises. [3]

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SL SECTION A 06w

3. The elements sodium, aluminium, silicon, phosphorus and sulfur are in period 3 of the periodic table.

- (a) Describe the metallic bonding present in aluminium and explain why aluminium has a higher melting point than sodium. [3]

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- (d) Explain, by reference to the intermolecular forces, why sulfur has a higher melting point than phosphorus. [2]

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SL SECTION A 04s