Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Inorganic 1

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Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Q1.

This question is about the first ionisation energies of some elements in the Periodic Table.

(a) Write an equation, including state symbols, to show the reaction that occurs when the first ionisation energy of lithium is measured.

_____

(1)

(b) State and explain the general trend in first ionisation energies for the Period 3 elements aluminium to argon.

Trend _____

Explanation _____

_____

_____

(3)

(c) There is a similar general trend in first ionisation energies for the Period 4 elements gallium to krypton.

State how selenium deviates from this general trend and explain your answer.

How selenium deviates from this trend _____

Explanation _____

_____

_____

(3)

(d) Suggest why the first ionisation energy of krypton is lower than the first ionisation energy of argon.

_____

_____

_____

(1)

(e) The table below gives the successive ionisation energies of an element.

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	First	Second	Third	Fourth	Fifth
Ionisation energy / kJ mol^{-1}	590	1150	4940	6480	8120

Deduce the group in the Periodic Table that contains this element.

_____

(1)

(f) Identify the element that has a 5+ ion with an electron configuration of $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}$

_____

(1)

(Total 10 marks)

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Q2.

Indium is in Group 3 in the Periodic Table and exists as a mixture of the isotopes ^{113}In and ^{115}In.

(a) Use your understanding of the Periodic Table to complete the electron configuration of indium.

$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6$ _____

(1)

(b) A sample of indium must be ionised before it can be analysed in a mass spectrometer.

(i) State what is used to ionise a sample of indium in a mass spectrometer.

_____

_____

(1)

(ii) Write an equation, including state symbols, for the ionisation of indium that requires the minimum energy.

_____

(1)

(iii) State why more than the minimum energy is **not** used to ionise the sample of indium.

_____

_____

(1)

(iv) Give two reasons why the sample of indium must be ionised.

Reason 1 _____

Reason 2 _____

(2)

(c) A mass spectrum of a sample of indium showed two peaks at *m/z* = 113 and *m/z* = 115. The relative atomic mass of this sample of indium is 114.5

(i) Give the meaning of the term *relative atomic mass*.

_____

_____

_____

_____

(2)

(ii) Use these data to calculate the ratio of the relative abundances of the two isotopes.

_____

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_____

_____

(2)

(d) State and explain the difference, if any, between the chemical properties of the isotopes ^{113}In and ^{115}In

Difference in chemical properties _____

Explanation _____

(2)

(e) Indium forms a compound **X** with hydrogen and oxygen. Compound **X** contains 69.2% indium and 1.8% hydrogen by mass.
Calculate the empirical formula of compound **X**.

_____

_____

_____

_____

_____

(3)

(Total 15 marks)

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