 Chemistry ATAR Year 11

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Task 3: Topic test: Electronic Structure and the Periodic table

Section 1: Multiple choice (10 marks) 27%

This section has 5 questions. Answer all questions by circling the correct option. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1 The –2 ion of element X has an electron configuration of 2,8,3. Which of the following statements is true based on information given?

A X is in period 3 and group 5.

B X is in period 2 and group 1.

C X is in period 3 and group 1.

D X is in period 2 and group 5.

The following information refers to Questions 2 and 3.

The atomic number, mass number and electron configuration of four particles, W, X, Y and Z, are given below.

|  |  |  |  |
| --- | --- | --- | --- |
| Particle | Atomic number | Mass number | Electron configuration |
| W | 17 | 37 | 2,8,8 |
| X | 19 | 39 | 2,8,8 |
| Y | 20 | 40 | 2,8,8,2 |
| Z | 19 | 40 | 2,8,8,1 |

2 Which one of the following alternatives lists particles that are isotopes of the same element?

A W and X only

B X and Z only

C Y and Z only

D W, X and Y only

3 Which one of the following statements is correct?

A W and X are noble gases.

B W is a positively charged ion.

C Y is in group 2 of the periodic table.

D Z is a negatively charged ion.

4 Which one of the following statements about group 1 elements is true?

A Potassium has more valence electrons than lithium.

B A francium atom has a smaller atomic radius than a sodium atom.

C Sodium is more electronegative than potassium.

D The core charge of each atom increases down group 1.

1. Which of the following is **not** proposed by the Bohr model of the atom?
2. Electrons can exist between two energy levels
3. Electrons revolve around the nucleus in fixed circular orbits
4. The electrons orbit corresponds to specific energy levels
5. Orbits of larger radii correspond to energy levels of higher energy

End of section 1

**Section 2: Short answer** 73% (27 marks)

This section has 4 questions. Answer all questions. Write your answers in the space provided. When calculating numerical answers, show your working or reasoning clearly. Express numerical answers to the appropriate number of significant figures and include appropriate units where applicable.

Do not use abbreviations, such as ‘nr’ for ‘no reaction’, without first defining them.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Question 6 (6 marks)

Complete the following table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Symbol | Atomic number | Mass number | Number of protons | Number of neutrons | Number of electrons |
|  | 19 |  |  | 21 | 18 |
| 209Bi3− |  |  |  |  |  |
|  | 92 | 234 |  |  | 92 |

Question 7 (15 marks)

a Use the periodic table to write a correct symbol for each of the following. (5 marks)

i the element that is in group 2 and period 4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_

ii a noble gas with exactly 3 occupied electron shells \_\_\_\_\_\_\_\_\_\_\_\_\_\_

iii an element from group 14 that is a non-metal \_\_\_\_\_\_\_\_\_\_\_\_\_\_

iv the element in period 3 that has the largest atomic radius \_\_\_\_\_\_\_\_\_\_\_\_\_\_

v the element in group 16 that has the highest electronegativity \_\_\_\_\_\_\_\_\_

b Describe and explain the trends in **ionisation energy** for going down a group and across the periodic table. (Use correct terminology and include an explanation for ionisation energy in your answer) (5 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c Describe and explain the trends in **electronegativity** down the group and across a period in the periodic table. (Use correct terminology and include an explanation for electronegativity in your answer) (5 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. State the ground state electron configuration of the following: [4]
   1. Berylium
   2. Fluorine
   3. Potassium ion
   4. Sulfide ion
3. Identify the ion with a charge of -3 that has the electron configuration: [1]

2, 8, 8 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Identify the ion with a charge of +1 that has an electron configuration : [1]

2,8, 8, 8\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

End of questions