

Electronic Configuration and Periodic Table

Concept : Finding out the position in the periodic table by writing the sub-shell Electronic configuration

1. Y is an element in the periodic table. Its atomic number is 17. Find out the following characteristics.
- (a) Sub-shell electronic configuration : (1)
 - (b) Group number : (1)
 - (c) Period number : (1)
 - (d) Valency : (1)

Score (4) Time (3 minute)

Concept : Electronegativity

2. The electronegativity values of some elements is given below
- C - 2.5 Cl - 3.0 Mg - 1.2
- (a) Which type of chemical bond is present in the compound formed between magnesium and chlorine? (1)
 - (b) What is the type of chemical bond in the compound formed between carbon and chlorine? Write the chemical formula of the compound. (2)

Score (3) Time (3 minute)

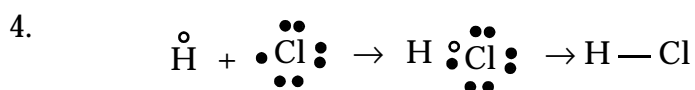
Concept : Finding out the position in the periodic table by writing the sub-shell electronic configuration

3. The outermost electronic configurations of two elements are given in the table shown below. Find out the other characteristics of these elements and fill up the table.

Element	X	Y	
(a) Outer electronic configuration	3p ⁶	3d ⁶ 4s ²	
(b) Complete sub-shell electronic configuration			(1)
(c) Atomic number			(1)
(d) Group			(1)
(e) Block			(1)

Score (4) Time (3 minute)

Concept : Electronegativity and polar character



- (a) What is the type of bond present in HCl? (1)
- (b) What is the reason for HCl existing as a polar molecule? (1)

Score (2) Time (2 minute)

Concept : Finding out the position in the periodic table by writing the sub-shell electronic configuration

5. The symbol of an element is given as ${}_8\text{O}$. Find out the following.

- (a) Total number of electrons (1)
- (b) Sub shell electronic configuration (1)
- (c) Total number of electrons in s-sub shells (1)
- (d) Electronegativity High / Low (1)

Score (4) Time (4 minute)

Concept : Sub shell electronic configuration

6. The atomic number of nickel (Ni) is 28. Write down the sub shell electronic configuration of the following.

- (a) ${}_{28}\text{Ni}$ (1)
- (b) Ni^+ (1)
- (c) Ni^{2+} (1)

Score (3) Time (3 minute)

Concept : Sub shell electronic configuration

7. Properties of elements are given in column A, group numbers in column B and the ionization energies in column C. Match them correctly.

A	B	C	
(a) Highly reactive metal	18	2372 kJ/mol	(1)
(b) Inert gas	17	496 kJ/mol	(1)
(c) Non metal	1	1256 kJ/mol	(1)

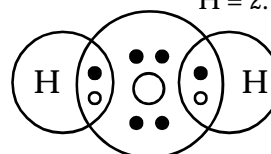
Score (3) Time (3 minute)

Concept : Electronegativity and polar nature

8. See the bonding in H_2O depicted

Electronegativity values

H = 2.1, O = 3.5



- (a) Which type of chemical bond is present in this? (1)
- (b) How is the polar nature of H_2O explained? (2)

Score (3) Time (3 minute)

Concept : Understanding the trends in the periodic table

9. See the portion of the Periodic Table shown below:

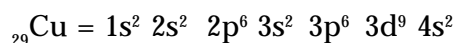
1																	18				
A	2											13					14	15	16	17	
B													G	H					J		
C																					
		3	4	5	6	7	8	9	10	11	12										
D				L			E			F						I	M				

- (a) Which element has 7 electrons in the outermost shell? (1)
- (b) Which element has the outer sub shell electronic configuration $3d^3 4s^2$? (1)
- (c) Which element has the highest ionization energy? (1)
- (d) Which is the biggest atom in first group? (1)

Score (4) Time (4 minute)

Concept : To get the ability for writing the sub shell electronic configuration

10. When the teacher asked a student to write the electronic configuration of copper, he wrote it on the board as follows



But many other students in the class said that it was wrong.

- (a) Can you write this correctly? Can you explain your answer? (2)
- (b) Then what will be the electronic configuration of Cu^{2+} ? (1)

Score (3) Time (4 minute)

Concept : The position of metals in the periodic table and their reactivity

11. Reactivity series

K Na Ca Mg Al

Position of the element in the periodic table

K fourth period first group

Na third period first group

Ca fourth period second group

Mg third period second group

Al third period thirteenth group

By analyzing the above, find out the correct statements among the following

- (a) More reactive metals are seen on the left side of the periodic table.
- (b) The reactivity increases from top to bottom in the group.
- (c) There is no relation between the reactivity of metals and their position in the Periodic Table.

Score (2) Time (3 minute)

Concept : To get an idea about shell and the sub shell electronic configuration

12. Some details of two elements are given.

A period 3 group 17

B period 3 group 13

Answer the following questions based on the above hints

- (a) How many shells are there in A and B? (1)

- (b) Write down the sub shell electronic configurations of both A and B. (2)
- (c) Which type of bond is present in the compound formed between A and B? Write its chemical formula. (2)

Score (5) Time (5 minute)

Concept : Sub shell electronic configuration and position of element in the periodic table

13. X is an element in group 15 of the periodic table (symbol not real). This is in period 3. In this element
- (1) How many shells are present? (1)
- (2) How many sub shells contain electrons? (1)
- (3) The number of electrons in the outermost shell. (1)
- (4) Is it a metal or a non metal? Substantiate your answer. (2)

Score (5) Time (5 minute)

Concept : Sub shell electronic configuration and position of element in the periodic table

14. Outer sub shell electronic configurations of some elements are given in column A. Based on the given electronic configuration match them with the properties given in column B.

A	B	
(1) $4s^1$	Element forming coloured compounds	(1)
(2) $3p^5$	Metal	(1)
(3) $3s^2$	Non metal	(1)
(4) $3d^6$	Element having the biggest atom	(1)

Score (4) Time (4 minute)

Concept : Different colours for the different oxidation states of an element

15. The substances, $\text{Fe}(\text{OH})_2$, $\text{Fe}(\text{OH})_3$ have different colours. With the help of the electronic configuration, give the reasons for this difference in the colour.

Hint : Atomic number of iron - 26

Score (3) Time (3 minute)

Concept : Electronic configuration and periodic table

16.

1																	18
	2											13	14	15	16	17	
												D					
		3	4	5	6	7	8	9	10	11	12						C
A					B												

This is a model of the Periodic Table. The outermost electronic configurations of some elements are given below. Choose the elements corresponding to each from the shaded portion of the periodic table.

- (1) $4s^1$ (1)
- (2) $2p^1$ (1)
- (3) $3p^6$ (1)
- (4) $3d^4 4s^2$ (1)

Score (4) Time (4 minute)

Concept : *f*-block elements

17. The black sand seen in the beaches of Kerala contains the elements uranium, thorium etc. Uranium and thorium are in the *f*-block of the periodic table. Write down two characteristics of *f*-block elements. (2)

Score (2) Time (2 minute)

Concept : Transition elements

18. The characteristics of the various blocks of the periodic table are given. Choose those properties which are relevant to d-block from this.
- (a) form coloured compounds
 - (b) last electron fills the *f* sub shell
 - (c) show variable oxidation states
 - (d) seen in the groups 1 and 2
 - (e) metals and non metals are present

Score (2) Time (3 minute)

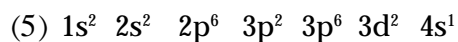
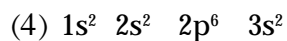
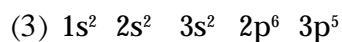
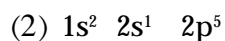
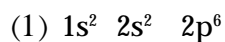
Concept : Sub shell electronic configuration

19. The electronic configurations of some elements are given (symbols are not real).
- A. $1s^2 2s^2 2p^6 3s^1$
 - B. $1s^2 2s^2 2p^6 3s^2$
 - C. $1s^2 2s^2 2p^4$
 - D. $1s^2 2s^2 2p^6 3s^2 3p^5$
- (1) Which are the elements with valency 1? (1)
 - (2) For which the valency is 2? (1)
 - (3) Write the molecular formulae of the compounds formed by the element A with the element C and with the element D. (1)
 - (4) With which of these elements, the element B will combine? Write down the molecular formulae of the compounds formed. (2)

Score (5) Time (5 minute)

Concept : Sub shell electronic configuration

20. Find out the wrong electronic configurations and correct them



(3)

Score (3) Time (3 minute)

Concept : Ionization energy

21. Some statements related to the ionization energy are given below. Choose the correct ones.

(1) Ionization energy increases as the size of the atom increases.

(2) Ionization energy is high for inert gases

(3) Ionization energy decreases from top to bottom in a group.

(4) Ionization energy will be high for elements having high electronegativity

(5) Ionization energy increases from left to right across a period

Score (4) Time (4 minute)
