CBSE TEST PAPER-01

CLASS - XI CHEMISTRY (Classification of Elements and Periodicity in Properties)

General Instruction:

- All questions are compulsory.
- Marks are given alongwith their questions.

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1. How many elements are known at present? [1]

2. Who was the first scientist to classify elements according to their properties? [1]

3. What is the basis of triad formation of elements? [1]

4. Stale the modern 'Periodic law'? [1]

5. Define and state Mendeleev's periodic law. [1]

6. How did Mendeleev arrange the elements? [2]

7. Name the two elements whose existence and properties were predicted by Mendeleev though they did not exist then. [2]

8. Describe the main features of Mendeleev's periodic table? [3]

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[ANSWERS]

Ans1. There are about 114 elements known at present.

Ans2. The German Chemist, Johann Dobereiner in early 1829 was the first to consider the idea of trends among properties of element.

Ans3. The middle element of each of the triads had an atomic weight about half way between the atomic weights of the other two. Also the properties of the middle element were in between those of the other two members. Dobereiner's relationship is known as the law of triads.

Ans4. The physical and chemical properties of the elements are periodic functions of their atomic numbers.

Ans5. Mendeleev's Periodic law states that

'The properties of the elements are periodic function of their atomic weights'.

Ans6. Mendeleev arranged elements in horizontal rows and vertical columns of a table in order of their increasing atomic weights in such a way that the elements with similar properties occupied the same vertical column or group.

Ans7. Mendeleev predicted not only the existence of gallium and germanium, but also described some of their general physical properties.

Ans8. (i) In Mendeleev table, the elements were arranged in vertical columns, and horizontal rows. The vertical columns were called groups and the horizontal rows were called periods.

(ii) There were in all eight groups. Group I to VIII. The group numbers were indicated by Roman numerals. Group VIII occupy three triads of the elements each i.e. in all nine elements.

(iii) There were seven periods to accommodate more elements the period 4, 5, 6 and 7 were divided into two halves. The first half of the elements were placed in the upper left corner and the second half in the lower right corner of each box.

CBSE TEST PAPER-03

CLASS - XI CHEMISTRY (Classification of Elements and Periodicity in Properties)

General Instruction:

- All questions are compulsory.
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1. Predict the position of the element in the periodic table satisfying the electronic configuration $(n-1)d^1ns^2$ for n=4, [1]

2. How does atomic size change in a group? [1]

3. Why Li and Mg show resemblance in chemical behaivour? [1]

4. The atomic radius of elements decreases along the period but Neon has highest size among III period element? Why. [1]

5. Explain why cations are smaller and anions are larger in radii than their parent atom? [2]

6. Define ionization enthalpy and electron gain enthalpy? [2]

7. How does metallic character change in a group? [2]

8. The size of an atom can be expressed by three radii. Name them. Which of these given the highest, and the lowest value of the atomic radius of an element? [2]

9. Among the elements B, Al, C and Si

(a) Which has the highest first ionization enthalpy?

(b) Which has the largest atomic radius? [2]

10. Na^+ has higher value of ionization enthalpy than Ne, though both have same electronic configuration. [2]

CBSE TEST PAPER-03

CLASS - XI CHEMISTRY (Classification of Elements and Periodicity in Properties [ANSWERS]

Ans1. $(n-1)d^1ns^2 = (4-1)d^14s^2$
$= 3d^14s^2$
It lies in fourth period and III B group.

Ans2. It increases from top bottom in a group.

Ans3. Due to diagonal relationship, since their atomic size, electro negativity and ionisation potential are almost the same.

Ans4. Ne is the only element in III period element which has Van der walls radius whereas the rest has covalent radius. And it is known fact that Van der walls radius is always greater than covalent radius.

Ans5. The radius of cation is smaller than the parent atom. Cation is formed by the loss of one or more electron from the gaseous atom, but the nuclear charge remains the same. As a result, the nuclear hold on the remaining electrons increases because of the increases in the effective nuclear change per electron resulting in decrease in size.
Whereas anion is formed by the gain of one or more electrons by the gaseous atom but the nuclear charge is same though the number of electrons has increased. The effective nuclear charge per electron decrease in the anion and the cloud is held less tightly by the nucleus. This causes increase in size.

Ans6. Ionization enthalpy – It represents the energy required to remove an electron from an isolated gaseous atom (x) in ground state resulting in the formation of a positive ion.
$x(g) + Energy \rightarrow x^+(g) + e^-$
Electron gain enthalpy – When an electron is added to a neutral gaseous atom (x) to convert it into a negative ion, the enthalpy change accompanying the process is defined as the electron gain enthalpy.
$x(g) + e^- \rightarrow x^-(g)$

Ans7. It increases from top to bottom in a group

Ans8. The atomic size are generally expressed in terms of the following radii covalent radius, metallic radius and Van der waal's radius.
Van der waal's radius > Metallic radius > covalent radius.

Ans9. (a) Carbon has the highest first ionization enthalpy.
(b) Aluminum has the largest atomic radius.

Ans10. Na^+ and Ne both has 10 electrons but Na^+ having, 11 protons in its nucleus (Ne has 10 protons) exert higher effective nuclear charge and thus removal of electron from Na^+ requires more energy.

CBSE TEST PAPER-04

CLASS - XI CHEMISTRY (Classification of Elements and Periodicity in Properties)

General Instruction:

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1. Define valency. [1]

2. How does valency vary in a group and period in the periodic table? [1]

3. What is the valency of noble gases? [1]

4. How do metals react in a period? [1]

5. How do metals react in a group? [1]

6. How does the reactivity of non–metals changes in a period and group? [2]

7. Give the properties of the oxides in a particular period. [2]

8. What is an amphoteric oxide? [1]

9. Define a neutral oxide. [1]

10. Why does lithium form covalent bond unlike other alkali which forms ionic bond? [2]

CBSE TEST PAPER-04

CLASS - XI CHEMISTRY (Classification of Elements and Periodicity in Properties)

[ANSWERS]

Ans1. The combining capacity of an element is known as valency.

Ans2. In a group, the valency of an element remains constant while in a period it increases from left to right.

Ans3. Noble gases on the extreme right are zero valent.

Ans4. The tendency of an element to lose electrons decreases in going from left to right in a period. Thus the reactivity of metals goes on decreasing in a period from left right.

Ans5. The tendency to lose electrons increases as we go down a group so the reactivity of metals increases down the group.

Ans6. The reactivity of non – metals is measured in terms of its tendency to gain electrons to form an ion. The reactivity of non – metals increases from left to right in a period whereas reactivity decreases in a group as we go down the group because the tendency to accept electrons decreases down the group.

Ans7. Elements on two extremes of a period easily combines with oxygen to form oxides. The normal oxide formed by the element on extreme left is the most basic $(eg. Na_2O)$ whereas that formed by the element on extreme right is the most acidic $(eg. cl_2O_7)$. Oxides at the centre are however amphoteric $(eg. Al_2O_3)$ or neutral $(eg. CO)$.

Ans8. Oxides which behave as acids with bases and as a base with an acid are called amphoteric oxide.

Ans9. Neutral oxides have no acidic or basic properties.

Ans10. Lithium forms covalent bond which is different from its group members because of its anomalous behaviour Li is small in size, large charge / radius ratio and has high electro negativity value. Also it has only $1s_2 2s_1$ orbital for bonding.