2. Periodic Classification of Elements Extra-Questions

Q. 1) Match the following

Column A	Column B
1) Eka – Silicon	Scandium
2) Eka – Boron	Gallium
3) Eka- Boron	Germanium
	Scandium

Ans :-

Column A	Column B
1) Eka – Silicon	Germanium
2) Eka – Boron	Scandium
3) Eka- Boron	Gallium

Q. 2) Match the following

Column A	Column B
1) zero group elements	Metalloid
2) halogens	Helium
3) Sodium	Group 17
4) Germanium	Helium
	Metal

Ans :-

Column A	Column B
1) zero group elements	Helium
2) halogens	Group 17
3) Sodium	Metal
4) Germanium	Metalloid

Q.3) Which is the most electronegative atom.

Ans : - Fluorine is the most electronegative atom.

Q.4) Which is the most reactive non-metal?

Ans : - Fluorine is the most reactive non-metal.

Q.5) ….. element is having strong metallic property in the third period.

Ans : - sodium (Na)

Q.6) Name the isotopes of chlorine

Ans : - $^{35}Cl_{17}$, $^{37}Cl_{17}$

Q.7) Which element has atomic number 92, that is radioactive and unstable. It's life span is also very short.

Ans : - Uranium.

Q.8) Dobereiner named the group of element having similar chemical properties into groups of three.

Ans : - True

Q.9) The properties of elements are the periodic function of their atomic masses. Is the following statement true of false?

Ans : - True

Q.10) Define the Mendeleev's Periodic Table.

Ans : - Properties of elements are periodic function of their atomic masses.

Q.11) Define the Modern Periodic Law

Ans : - Properties of elements are a periodic function of their atomic numbers.

Q.12) Write down the examples of Dobereiner's Triads.

Ans : - Triads of the elements are as follows –

1) Le (6.9) , Na(23), K(39.1)

2) Cl (35.5), Br (79.9), I (126.9)

3) Ca(40.1), Sr (87.6), Ba (137.3)

Q.13) what are the limitations of Dobereiner's law of triads.

Ans : - 1) only few triads of elements, known at that time could be identified by Dobereiner hence this law could be applied only to few elements. 2) The Dobereiner's law was not obeyed by other triads.

Q.14) Differentitate between the s-bolck and block

Ans : -

S-block	d-block
1) The S-blcok is formed of group 1 and 2	1) The d-block consist of groups 3 to 12
2) They have lor 2 electrons in the outer most shell.	2) The last two shells of the atoms are incompletely filled.

Q.15) What is the expected trend in the variation of non-metallic character of elements from left to right in a period, and elements down a group?

Ans : - While going from left to right in a period, the non-metallic character and electro negativity goes on increasing, and while going down a group, electronegativity decreases.

Q.16) What are the periodic trends in the modern periodic table.

Ans : - When the properties of elements in a period or a group of the modern periodic table are compared, certain regularity is observed in their variations is called the periodic trends in the modern periodic table.

Q.17) What are the types of matter?

Ans : - There are the five types of matter, solids, liquids, gases, plasma, and Bose-Einstein condensates.

Q.18) what are the limitations of Dobereiner's law of triads.

Ans : - Phosphorous (p) Sulphur (s), Chlorine (Cl), and Argon (Ar)

Q.19) State the Newland's law of octave.

Ans :- Newland's law of octave states that when the elements are arranged in increasing order of their atomic masses, the properties of the eighth elements are similar to the first.

Q.20) Differentiate between Mendeleev's periodic table and Modern periodic table.

Ans : -

Mendeleev's Periodic Table	**Modern periodic table.**
1) In Mendeleev's Periodic table, elements were arranged in an increasing order of atomic weight.	1) In the Modern periodic table, elements are arranged in an increasing order of atomic numbers.
2) In Mendeleev's Periodic table, there were 8 groups.	2) In modern periodic table, there are 18 groups.
3) Isotopes of same elements were given different positions.	3) Isotopes of same elements are given same positions.

4) A correct position could not be given to hydrogen in the Mendeleev's Periodic Table	4) Hydrogen element has been placed at the top of group I in the modern periodic table.

Q.21) what are the Transition elemetnts?

Ans : - The transition elements are the elements place in the groups 3 to 12, in the middle of the modern periodic table. The transition elements are placed in the d-block of the modern periodic table.

Q.22) What are the inner transition elements?

Ans : - The inner transition elements are placed in the two additional rows that are lanthanides and actinides. These two rows are placed separately at the bottom of the modern periodic table. The inner transition elements are place in f-block of modern periodic table.

Q.23) find out which elements from the given belong to, period 3? $_{3}Li$, $_{14}Si$, $_{2}He$, $_{11}Na$, $_{15}P$

Ans :- The element $_{14}Si$, $_{2}He$, $_{11}Na$, $_{15}P$ Belong to period 3. Elements that contain same number of shells, that have

electrons are of the same period. The Si, Na and P these elements each have 3 shells, and thus all these elements belong to third period.

Q.24) Non-metallic character of the elements, increases while moving from left to right in aperiodic table.

Ans :- Non-metals, are the elements that tend to gain electrons, so that they can achieve the octet state in their outermost orbit. While going across a period, the element gains more electrons as the nuclear pull increases, and at the same time atomic size decreases. Hence, non-metallic character of the elements, increases while moving from left to right in periodic table.

Q.25) Why do inert gases exist in the form of free atom?

Ans :- The atoms of the inert gases have the outermost shell completely filled. As the outer shell is completely filled these atoms have achieved a stable electronic configuration and also a complete duplet. When an element has achieved a complete duplet state, these elements do not lose, gain or share electrons. These

elements do not take part in chemical reactions. Hence inert gases exist in the form of free atoms.

Q.26) Isotopes occupy the same place in the modern periodic table. Give reason.

Ans :- 1) Isotopes are atoms of the same element having different mass number.

2) When the atomic number is same , they are placed in same place. The position of an element in the modern periodic table is dependent on the atomic number. Hence the isotopes occupy the same place in the modern periodic table.

Q.27) Write an example of Dobereiner's Triad.

Ans :- Lithium (Li) 6.9(a)

Sodium (Na) = ?

Potassium (K) = 39.1 (b)

$$\therefore \frac{a+b}{2}$$

$$= \frac{6.9+39.1}{2}$$

$= \frac{46}{2}$

$= 23$

Q.28) Non-metallic character of the elements, increases while moving from left to right in aperiodic table.

$_{1}H$, $_{7}N$, $_{20}Ca$, $_{16}S$, $_{4}Be$, $_{18}Ar$.

Which of the following elements belong

$_{1}H$ – 1

$_{7}N$ = 2, 5

$_{20}Ca$ – 2, 8, 8, 2

$_{16}S$ – 2, 8, 6

$_{4}Be$ – 2, 2

$_{18}Ar$ – 2, 8, 8

Ans :- $_{20}Ca$ and $_{4}Be$ have valency ‘2’ as they have 2 electrons in the outermost shell or valence shell, hence they belong to the second group.

Q.29) Which is the most electropositive element among these?

$_4$Be – 2, 2

$_6$C – 2, 4

$_8$O – 2, 6

Ans :- $_4$Be is more electropositive.

Q.30) The atomic number of beryllium is 4, while that of oxygen is 8, write down the electronic configuration of the two and deduce their valency from the same.

Ans :- 1) $_4$Be – 2, 2

∴ Valency 2 and electro positive element.

2) $_8$O – 2, 6

∴ Valency 2 and electro negative element.

Q.31) State the Newlands laws of Octaves.

Ans :- The Newlands laws of Octaves state, when elements are arranged in the increasing order of their atomic masses, every eighth element has properties similar to the first element. The laws of octaves have similarity with the octaves of music, as Newlands compared it with the octaves of music.

Q.32) Why are Halogens highly electronegative?

Ans :- 1) The halogens belong to group 17, that are just before the inert gases or noble gases. 2) The halogens are at the extreme of the period. Hence they are the smallest in size within a period. 3) As they have smaller size, they have maximum nuclear charge, which results in high electronegativity.

Q.33) Write a note on Mendeleev's periodic table.

Ans :- Mendeleev's periodic table is based on the periodic law. The periodic law states that the properties of the elements are a periodic function of their atomic mass. In the Mendeleev's periodic table, the elements that have similar properties repeat at regular intervals, that is they are periodic. The periodic table is divided into columns and groups. The horizontal rows in the table are called periods and vertical columns are called groups. All the elements in the groups exhibit similar properties and are further divided into A and B sub-groups.

Q.34) Describe the Dobereiner's Triads.

Ans :- The Dobereiner's Triads are performed on 3 elements that are chemically similar. These 3 chemically similar elements are then arranged in the increasing order of their atomic masses. Then the atomic mass of the middle element is the arithmetic mean of the atomic masses of the other two elements in the triad.

E.g. 1) Cl, Br, I

2) Ca, Sr, Ba

Q.35) Why are d-block elements called as transition elements?

Ans :- All the d-block elements exhibit a gradual change int the metallic character compared to other metals on the left. Transition means gradual change, hence are called d-block elements.

Q.36) Write the molecular formulae of the compounds of the following elements with hydrogen by referring to the Mendeleev's periodic table,

C, S, Br, As, F, O, N, Cl

Ans :-

Elements	Compounds (with hydrogen)
C	CH_4 Methane
S	H_2S Hydrogen Sulphide
Br	HB_r Hydrogen Bromide
As	A_sh_3 Arsine
F	HF Hydrogen Fluoride
O	H_2O water
N	NH_3 Ammonia
Cl	HCl Hydrogen chloride.

Q.37) Write a note on scientist Henry Moseley's contribution to modern periodic table.

Ans :- 1) The scientific world did not know anything about the interior of the atom when Mendeleev's periodic table was known. When electron was discovered Scientists started exploring the relation in electron number of an atom and the atomic number.

2) In 1913 A.D the English scientist Henry Moseley demonstrated with the help of the experiments done using X-ray tube, that the atomic number (z) of an element corresponds to the positive charge on the nucleus or the

number of the protons in the nucleus of the atom of that element. While the atomic number in Mendeleev's periodic table only indicated the serial number of the element.

3) According to his theory, the atomic number is more fundamental. Property of an element than its atomic mass

4) Accordingly the statement of the modern periodic law was stated as follows - 'properties of elements are a periodic function of their atomic numbers.'

Q.38) Write a note on the zig-zag line, in the modern periodic table.

Ans :- 1) The zig-zag line is in the p-block. 2) The three traditional types of elements are shown in the modern periodic table, which are metals, non-metals and metalloids. 3) All the metalloid elements lie along the border of zig-zag line. 4) All the metals lie on the left of zig-zag line. 5) All the non-metals lie on the right side of zig-zag line.

Q.39) Atomic radius goes on decreasing while going from left to right in a period. Explain the following with scientific reason.

Ans :- 1) while going from left to right in a period, the atomic radius goes on decreasing and the atomic number increases by one that is the positive charge on nucleus increases by one.

2) Atomic radius is the distance between the nucleus of an atom and its outermost shell.

3) The atomic radius is expressed in the unit picometer (PM) which is smaller than nanometer (1 pm = 10^{-12})

4) The additional electron gets added to the same outermost shell.

5) Due to the increased nuclear charge the electrons are pulled towards the nucleus to a greater extent.

6) Hence the size of atom decreases that means, atomic radius decreases. Therefore, the atomic radius goes on decreasing while going from left to right.

Q.40.) zero group elements are called Noble gases.

Ans :- In the atoms of inert gases, all the electronic shells including the outermost shell are completely filled. As the outermost shell is completely filled the elements have achieved duplet or octet state. Hence these elements do not

lose or accept electrons nor do not take part in chemical reaction.

Q.41.) Fluorine is the most reactive among the halogens.

Ans :- The electronic configuration of fluorine is 2, 7 hence to compete the octet state only one electron is required. The nuclear attraction on the outermost electron is maximum, as the atomic size of fluorine is the smallest among the halogens.

Q.42.) Sodium is more metallic than aluminum.

Ans :- 1) The electronic configuration of sodium is 2, 8, 1. It has only one electron in the outermost shell. 2) Metals have a tendency to give electrons. Sodium easily donates one single electron in the outermost shell. Hence it is a strong metal. 3) The electronic configuration of Aluminum is 2, 8, 3. Aluminum has 3 electrons in the outermost shell. 4) When compared to sodium, donating 3 electrons is difficult than donating one electron. Hence sodium is more metallic than aluminium.

Q.43.) How does valency vary in a period and in a group?

Ans :- **I) In a group :-** In a group the elements in a group, have the same number of valence electrons in the

outermost shell. Hence the elements belonging from the same group show the same valency.

II) In a period :- The variation in the valency in a period is due t electronic configuration. The changes in the valency in a period take place from left t right. The valency increases from 1 to 4 for 2^{nd} and 3^{rd} period and then decreases gradually from 4 to 0.

Q.44.) Write down the electronic configuration of the following elements of from the given atomic numbers.

N_7, C_6, O_8, B_5, Al_{13}

Find out the most electronegative element among these.

Ans :-

Element	Atomic No.	Electronic Configuration
1) N	7	(2, 5)
2) C	6	(2, 4)
3) O	8	(2, 6)
4) B	5	(2, 3)
5) Al	13	(2,8, 3)

Electronegativity is dependent on the tendency to accept electrons and form anions. Nitrogen and oxygen are the most electronegative elements.

Q.45) Write down the electronic configuration of the following elements of from the given atomic numbers.

$F_{(g)}$, $Be_{(4)}$, $Cl_{(17)}$, $Na_{(11)}$, $Al_{(13)}$ which of these elements belongs to group 17?

Ans :-

Element	Atomic No.	Electronic Configuration
1) F	9	(2, 7)
2) Be	4	(2, 2)
3) Cl	17	(2, 8, 7)
4) Na	11	(2, 8, 1)
5) Al	13	(2,8, 3)

F and Cl belongs to group 17, as,

1) There are 7 electrons in he last shell.

2) Group no- 17, are halogens having 7 electrons in outermost shell.

Q.46) What are the limitations of Newlands law of octaves?

Ans :- Following are the limitations of Newland's law of octaves -i) It was found that Newlands law of octave was applicable only up to calcium, out of total 56 elements

known at that time. ii) The law that after every eighth element possess properties similar to the 1st, was not applicable after calcium. 3) Newlands placed two elements each in some boxes to accommodate all the known elements in the table.

For example – Co and Ni under the note Do along with halogens, while Fe having similarity with Co and Ni away from them along with the non-metals O and S under the note Ti. 4) Newlands periodic table did not include noble (inert) gases because they were not known at that time. 5) Newlands octaves did not have provision to accommodate the newly discovered elements. 6) The properties of the new elements discovered after on did not fit in the Newlands law of octaves.

Q.47) Depending on electronic configuration the properties of the elements vary in different groups Explain why?

Ans :- 1) The periodic table has 18 vertical columns these are called as groups. These groups are 1 and 2, 13 to 18, and 3 to 12.

2) The number of valence electrons in all these elements from the group 1, i.e. alkali metals is the same. The

elements from other group, the number of the valence electrons to be the same. For example, the elements beryllium (Be), Mangesium (Mg), and Calcium (Ca) belong to the group2. The number of valence electrons is 2. There are 7 electrons in the outer most shell of the elements such as Fluorine and chlorine (Cl) from group 17 the number of valence electrons is 1. Hence the elements belonging to the same group have the same valence electrons and chemical properties.

While going from top to bottom in a group, one electronic shell is added. The atomic radius and atomic size increases and show the gradation of the properties of the elements down the group. Hence the electronic configuration of the outermost shell is the characteristic of a particular group.

Q.48) Depending on the electronic configuration the properties of element vary in different periods. Explain

Ans :- 1) The modern periodic table, seven horizontal rows called periods. 2) In a period, when the valency of an elements varies electronic configuration. 3) The number of valence electrons is different, but the number of shells is

the same. In a period, while going from left to right, the atomic number increases by one and also the number of valence electrons increases by one. In a period, there is gradation in properties of elements. 4) The elements that have same number of shells that contain electrons are of the same period. The elements in the second period. The elements in the second period Li, Be, B, C, N, O, F and Ne, contain electrons in the two shells which are k and L. 5) The elements that belong to the third period Na, Mg, Sl. Si, P, S, Cl and Ar have electrons in the three shells k, L and M.

6) The chemical reactivity of an element is known by the number of valence electrons in it and the valence shell. In a period, while going from left to right, the atomic number increases by one at a time, as a result gradually decreases. Hence the atomic size decreases.

Q.49) Find the relation between Hydrogen and Alkali metals by writing the compounds of both with chlorine, sulphur and oxygen.

Ans :-

Compounds of	Compounds of Na.

H	Na
HCl	Na_2S
H_2S	Na_2S
H_2O	Na_2O

The electronic configuration of hydrogen resembles that of alkali metals. Similar to alkali metals hydrogen combines with halogen, oxygen and sulphur, to form compounds that similar formulae.

Q.50) What are the demerits of Mendeleev's periodic table?

Ans :-1) At some places an element of higher atomic mass [Co = 58.93) is place before element of lower atomic mass, Nickel [Ni = 58.71]. This created ambiguity regarding the sequence in the periodic table.

2) Isotopes were given same position in the periodic table. Isotopes have same chemical properties but different atomic masses, so it was challenging to place them in the Mendeleev's periodic table.

3) When the elements are arranged in an increasing order of atomic masses the rise in atomic mass is not equal.

Elements could not be predicted how many elements could be discovered between two heavy elements.

4) Mendeleev could not place hydrogen in a correct position in the periodic table as hydrogen shows similarity with halogen as well as alkali metals. For e.g. Na k etc.

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