5. Periodic Classification of Elements

Very Short Answer Type Questions-Pg-281

1 A. Question

On what basis did Mendeleev arrange the elements in his periodic table?

Answer

The basis of arrangement is atomic mass. The mass of atom expressed in atomic mass units.

1 B. Question

On what basis are they arranged now?

Answer

Now they are arranged on the basis of their atomic number. The number of protons in the nucleus of the atom is the atomic number of that element.

2. Question

State whether the following statements are true or false:

(a) Newlands divided the elements into horizontal rows of eight elements each.

(b) According to Mendeleev's periodic law, the properties of elements are a periodic function of their atomic numbers.

(c) The elements in a group have consecutive atomic numbers.

Answer

(a) This Statement is False. He divided the elements into horizontal rows of seven elements.

(b) This Statement is False. He stated that the properties of elements are a periodic function of their atomic weight.

(c) This Statement is False. They are arranged according to their atomic masses.

3. Question

Name the Russian chemist who said that the properties of elements are a periodic functions of their atomic masses.

Answer

This Statement was given by famous Russian Chemist Dmitri Mendeleev.

4. Question

Rewrite the following statements after correction, if necessary:

(a) Group have elements with consecutive atomic numbers.

(b) Periodic are the horizontal rows of elements.

(c) Isotopes are the elements of the same group.

Answer

(a) Periods have elements with consecutive atomic number.

(b) This Statement is Correct.

(c) This Statement is Correct.

5. Question

Name the scientists who gave the following laws in the early classification of elements:

(a) Law of octaves

(b) Law of triads

Answer

(a) This law was given by the English chemist J.A.R Newlands in 1865.

(b) This Law was given by Dobreiner.

6. Question

A, B and C are the elements of a Dobereiner's triad. If the atomic mass of A is 7 and that of C is 39, what should be the atomic mass of B?

Answer

Mass of B is 23. According to Dobereiner the atomic weight of middle element is nearly the same as average of the atomic weight of other two elements.

7. Question

X and Y are the two elements having similar properties which obey Newland's law of octaves. How many elements are there in-between X and Y ?

Answer

There are six elements between X and Y elements.

8. Question

What was the Mendeleev's basis for the classification of elements ?

Answer

The classification was according to the atomic mass of the elements.

9. Question

In the classification of the then known elements, Mendeleev was guided by two factors. What are those two factors ?

Answer

Guidance to Mendeleev was provided by the following two factors:

1) The first factor was the increasing atomic mass.

2) The second factor was grouping together of elements having similar properties.

10. Question

Name two elements whose properties were predicted on the basis of their positions in Mendeleev's periodic table.

Answer

The two elements are Gallium and Scandium. Gallium was also called Eka boron and Scandium was also called Eka Alluminium.

11. Question

The three elements predicted by Mendeleev from the gaps in his periodic table were known as eka- boron, eka-aluminium and eka – silicon. What names were given to these elements when they were discovered later on ?

Answer

These names were given by Mendeleev. Later on eka-boron was named as Scandium, eka-alluminium was named as Gallium and eka- silicon was named as germanium.

12. Question

Name two elements whose properties were predicted on the basic of their positions in Mendeleev's periodic table.

Answer

The two elements whose properties were predicted on the basis of their position in the periodic table are Gallium and Scandium. Gallium was also called Eka boron and Scandium was also called Eka Alluminium.

13. Question

State one example of a Dobereiner's triad's showing in it that the atomic mass of middle element is half-way between those of the other two.

Answer

Acc. To Dobereiner the average of first and third element atomic masses is equal to the atomic mass of second element. For example: Lithium, Sodium and Potassium. Lithium is first element, sodium is middle element and potassium is third element so the average of atomic masses of lithium and potassium must be equal to Sodium. This is true. Atomic mass of Li is 7 while atomic mass of K is 39. And their average is 23 i.e. the atomic mass of sodium.

14. Question

Which group of elements could be placed in Mendeleev's periodic table later on, without disturbing the original order ? Give reason.

Answer

Noble gas could be placed without disturbing the original order because they are unreactive. Due to this they could be placed in a separate group.

15. Question

Fill in the blanks with suitable words:

(a) The basis for modern periodic table is _____

(b) The horizontal rows in a periodic table are called _____

(c) Group 1 elements are called _____

(d) Group 17 elements are known as _____

(e) Group 18 elements are called _____

(f) According to Newland's classification of elements, the properties of sulphar are similar to those of oxygen because sulphur is the _____ element starting from oxygen.

Answer

(a) The new or modern periodic table is made on the basis of atomic number.

(b) They are called periods and the vertical rows in a periodic table are called as groups.

(c) Group 1 elements are alkali, these are the bases which can be mixed with water.

(d) They are known as Halogens. Halogens are the group of non-metallic elements.

(e) They are known as Noble gases. Noble gases are unreactive gases.

(f) This is because sulphur is the eighth element starting from oxygen. According to Newland's statement the property of the element is similar to the element which has 8th position from the starting element.

Short Answer Type Questions-Pg-282

16 A. Question

What is meant by (i) a group, and (ii) a period, in a periodic table ?

Answer

The elements present in the Vertical rows are known as Group.

The elements present in the Horizontal Rows are known as Period.

16 B. Question

How many periodic and group are there in the long form of periodic table ?

Answer

There are 18 groups and 7 periods in the modern periodic table.

16 C. Question

Give two example each of (i) group 1 elements (ii) group 17 elements (iii) group 18 elements.

Answer

(i) Sodium and Potassium are the first group elements.

(ii) Chlorine and Bromine are the 17 group elements.

(iii) Argon and Xenon are the 18 group elements.

17 A. Question

In the modern periodic table, which are the metals among the first ten elements ?

Answer

Lithium and Beryllium are the metals among the first ten elements of modern periodic table.

17 B. Question

What is the significance of atomic number in the modern classification of elements ? Explain with the help of an example.

Answer

The properties of the elements in the modern periodic table are a function of their atomic number.

For example

The atomic number of the hydrogen is 1 and Lithium is 3 so both the elements have 1 valence electrons.

18 A. Question

How were the positions of isotopes of an element decided in the modern periodic table ?

Answer

Isotopes of same elements have same atomic number so they are placed at same position.

18 B. Question

How were the positions of cobalt and nickel resolved in the modern periodic table ?

Answer

In modern periodic table the elements are placed according to their atomic number so cobalt is 27 and nickel is 28, so in modern periodic table cobalt comes first and then Nickel.

18 C. Question

Where should hydrogen be placed in the modern periodic table ? Give reason for your answer.

Answer

Hydrogen is placed in 1^{st} group which belongs to alkali metals because it has a valence electron and it acts as an alkali element.

19 A. Question

On which side of the periodic table will you find metals ?

Answer

On the left side of the periodic table we will find the metals. The alkali metals and the alkaline earth metals are placed on the left side of the periodic table.

19 B. Question

On which side of the periodic table will you find non-metals ?

Answer

Non metals like oxygen, sulphar, phosphorus etc are placed on the right side of the modern periodic table.

19 C. Question

What is the name of those elements which divide metals and non-metals in the periodic table ?

Answer

Boron, Silicon, Germanium etc are called metalloids and divide metals and the non metals in the periodic table.

20 A. Question

Name three elements that have a single electron in their outermost shells.

Answer

Hydrogen, Rubidium and Caesium have 1 electron in their outermost shells.

20 B. Question

Name two elements that have two electrons in their outermost shells.

Answer

Barium and Radium are the two elements which have two elements in their outer most shell.

20 C. Question

Name three elements with completely filled outermost shells.

Answer

The noble gases like Argon, Krypton, Xenon have three elements with completely filled outermost shells.

21. Question

What is Dobereiner's law of triads ? Explain with the help of one example of a Dobereiner's triad.

Answer

When elements are arranged in oder of their atomic masses then the average of first and third element atomic masses is equal to the atomic mass of second element.

For example- In alkaline earth metals group the first element is beryllium, the middle element is magnesium and the third element is calcium, so acc. To the Debereiner's triad the arithmetic mean of the atomic masses beryllium and calcium is equal to the atomic mass of magnesium.

22. Question

What is Newland's law of octaves ? Explain with an example.

Answer

Newland gave the law of octaves in 1864. According to this law, when elements are arranged in the order of increasing atomic masses then the physical and chemical property of every eighth element is similar to first element. The idea of this law came to his mind from the seven musical notes of the music.

For example- Sodium and Lithium have same property because sodium is the eighth element from Lithium.

23 A. Question

Did Dobereiner's triads also exist in the columns of Newland's law of octaves ? Explain your answer.

Answer

Yes Dobereiner's triads also exist in the columns of Newland's law of octaves. In Newland's Periodic table in the second column lithium, sodium and potassium are present. Starting with lithium as the first element, the eighth element will be sodium. According to Newland's law of octaves the properties of every 8^{th} element should be similar to the properties of the first element. So, properties of lithium and sodium should be same. Also, if we start from sodium as the first element, then potassium is the eighth element so their properties should also be similar. Hence, according to Newland's law of octaves, lithium, sodium and potassium have similar chemical properties. It is also known to us that lithium, sodium and potassium form a Dobereiner's triad. Hence, we can conclude that Dobereiner's triads also exist in the columns of Newlands octaves.

23 B. Question

What were the limitations of Dobereiner's classification of elements?

Answer

A major limitation of DObereiner's classification was that he could not arrange all the existing elements in the form of triads which comprised of elements having same chemical properties. He could only identify three sets of triads at that time. This drawback became the reason for his classification not becoming successful.

Besides this, he failed to describe any relation between the atomic mass of elements and the chemical properties.

23 C. Question

What were the limitations of Newland's law of octaves?

Answer

Limitations of Newland's law of octaves are listed as below:

(i) This law was applicable only for lighter elements. It did not hold true for the classification of elements after calcium. After calcium, not every eighth element had properties similar to the first element.

(ii) He thought that only 56 elements existed in nature and that no more would ever be discovered. However, later many new elements were discovered and their properties did not fit into Newland's law of octaves.

He put two elements in one slot even in the column of unlike elements having different properties. For example, he put cobalt (Co) and nickel (Ni) in a single slot with elements like fluorine, chlorine and bromine with which their properties do not match at all.

24 A. Question

State the periodic law on which Mendeleev's periodic table was based. Why and how was this periodic law changed ?

Answer

Mendeleev's periodic law was based on the statement that physical and chemical properties of the elements are the periodic function of their atomic masses.

This law was changed because there were many demerits in this law, the position of hydrogen in Mendeleev's periodic table was confusing. He also put three elements in the same block.

24 B. Question

Explain why, the noble gases are placed in a separate group.

Answer

Noble gases like Argon, Hellium, Xenon are placed in the separate group because these gases are highly unreactive and their properties do not match the properties of the other elements.

25 A. Question

State the merits of Mendeleev's classification of elements.

Answer

The merits are:-

1) He predicted that not all elements had been discovered that time and there was a possibility of discovery of some in future.

2) According to his classification, the properties of elements could be predicted on the basis of their positions in the periodic table.

3) The most important merit of Mendeleev's classification was that it easily accommodates noble gases after they were discovered.

25 B. Question

Describe two anomalies of Mendeleev's periodic classification of element.

Answer

The two anomalies were:-

1) It could not explain the position of isotopes. Since the elements were arranged according to the atomic masses, isotopes should have been given separate positions, which was not the case. The isotopes were not given separate places. This could not be explained by Mendeleev's periodic law.

2) It could not explain the wrong order of atomic masses. When the elements were put in their correct group according to their chemical properties, it was discovered that the element with higher atomic mass came first and the element with lower atomic mass came later.

26 A. Question

How do the properties of eka- aluminium element predicted by Mendeleev compare with the actual properties of gallium element ? Explain your answer.

Answer

Eka- Alluminium and Gallium is the same element suggested by Mendeleev. The properties like density, mass, chlorine and oxide formula is almost same of eka alluminium and gallium.

26 B. Question

What names were given by Mendeleev to the then undiscovered elements(i) scandium (ii) gallium, and (iii) germanium ?

Answer

(i) Scandium was named as Eka- Boron.

(ii) Gallium was named as eka- alluminium

(iii) Germanium was named as eka- silicon.

Long Answer Type Questions-Pg-283

27 A. Question

Why do we classify elements ?

Answer

We classify elements into groups or periods in such a way that the elements of the same group possess similar properties and this makes the study of large number of elements reduced to the study of few elements.

27 B. Question

What were the two criteria used by Mendeleev to classify the elements in his periodic table ?

Answer

Two criteria used by Mendeleev were:

(i) Mendeleev arranged the elements in increasing order of their atomic masses.

(ii) He put elements having similar properties in same group.

27 C. Question

Why did Mendeleev leave some gaps in his periodic table ?

Answer

Mendeleev left some gaps in his periodic table because he wanted to make sure that the elements having similar properties came in the same groups.

27 D. Question

In Mendeleev's periodic table, why was there no mention of noble gases like helium, neon and argon?

Answer

Mendeleev did not mention noble gases in his periodic table because at that time noble gases were not invented, so there was no group of noble gases in Mendeleevs's Periodic table.

27 E. Question

Would you place the two isotopes of chlorine, C1-35 and C1-37 in different slots because of their different atomic masses or in the same slot because their chemical properties are the same? Justify your answer.

Answer

It is so because they have similar chemical properties and same atomic number.

28 A. Question

State Mendeleev's periodic law.

Answer

According to Mendeleev's periodic law the properties of the elements are a periodic function of their atomic masses.

28 B. Question

What chemical properties of elements were used by Mendeleev in creating his periodic table ?

Answer

The formulae of oxides and hydrides of the elements having similar chemical properties are same, these properties helped Mendeleev to create his periodic table.

28 C. Question

State any three limitations of Mendeleev's classification of element.

Answer

The three limitations of Mendeleev's Classification are:

(i) The position of hydrogen was a big issue, he put hydrogen in the group of alkali metals.

(ii) He did not explain the wrong order of atomic masses of some elements.

(iii) The position of the isotopes of some elements could not be explained by him.

28 D. Question

Besides gallium, which two other elements have since been discovered for which Mendeleev had left gaps in his periodic table.

Answer

The other two elements for which Mendeleev had left gaps in his Periodic table are Silicon and Germanium.

28 E. Question

Which group of elements was missing from Mendeleev's original periodic table ?

Answer

The group of Noble Gases was missing from Mendeleev's original Periodic table because at that time noble gases were not discovered.

29 A. Question

State modern periodic law.

Answer

Modern Periodic law which was given by Bohr stated that the physical and chemical properties of elements are the periodic function of their atomic number.

29 B. Question

How does the electronic configuration of the atom of an element relate to its position in the modern periodic table ?

Answer

In the modern periodic table, the elements having same electronic configuration are placed in a group i.e have same number of valence electrons in their last shell.

29 C. Question

How could the modern periodic law remove various anomalies of Mendeleev's periodic table? Explain with examples.

Answer

When the elements are arranged on the increasing order of their atomic number, then the anomalies could be removed.

(i) The position of isotopes was resolved in the modern periodic law. All the isotopes of an element have the same number of protons, so their atomic number is also the same. Due to same atomic number, they can be put in one place.

(ii) The position of cobalt and nickel was also resolved. The atomic number of cobalt is 27 and that of nickel is 28. Now, according to modern periodic law, the cobalt with lower atomic number (27) should come first and nickel with higher atomic number (28) should come later, even if their atomic masses are in the wrong order.

(iii) The position of hydrogen is also resolved because in modern periodic law hydrogen is placed in first group of alkali metals because alkali have 1 valence electron in its last shell and hydrogen also has 1 electron in its last shell.

29 D. Question

Name the scientist who prepared modern periodic table.

Answer

Niels Henrik David Bohr was the physicist from Denmark who prepared the modern periodic law.

Multiple Choice Questions (MCQs)-Pg-283

30. Question

In Mendeleev's periodic table, gap was not left for one of the following elements. This element is :

A. gallium

B. beryllium

C. germanium

D. scandium

Answer

In Mendeleev's periodic table, gap was not left for **Beryllium**.

31. Question

The Newland's law of octaves for the classification of elements was found to be applicable only up to the element :

A. Potassium

B. calcium

C. cobalt

D. phosphorus

Answer

The Newland's law of octaves for the classification of elements was found to be applicable only up to **Calcium**.

32. Question

According to Mendeleev's periodic law, the elements were arranged in the periodic table in the order of:

A. decreasing atomic numbers

B. increasing atomic numbers

C. decreasing atomic masses

D. increasing atomic masses

Answer

According to Mendeleev's periodic law, the elements were arranged in the periodic table in the order of **increasing atomic masses.**

33. Question

The three elements having chemical symbols of Si, B and Geare :

A. all metals

B. all non-metal

C. all metalloids

D. Si is metalloid, B is metal and Ge is non-metal

Answer

The three elements having chemical symbols of Si, B and Ge are **αλλμεταλλοιδσ**.

34. Question

In Mendeleev's periodic table, gaps were left for the elements to be discovered later on. An element which found a vacant place in the periodic table later on is :

A. Be

B. Si

C. Ge

D. Se

Answer

In Mendeleev's periodic table, gaps were left for the elements to be discovered later on. An element which found a vacant place in the periodic table later on is **Ge**.

35. Question

The three imaginary elements X, Y and Z represent a Dobernenner's triad. If the atomic mass of element X is 14 and that of element Y is 46, then the atomic mass of element Z will be :

A. 28

B. 60

C. 78

D. 72

Answer

The three imaginary elements X,Y and Z represent a Dobernenner's triad. If the atomic mass of element X is 14 and that of element Y is 46, then the atomic mass of element Z will be 78.

36. Question

The atomic numbers of four elements P, Q, R and S are 6, 8, 14 and 16 respectively. Out of these, the element known as metalloid is

A. P

B. Q

C. R

D. S

Answer

The atomic numbers of four elements P, Q, R and S are 6, 8, 14 and 16 respectively. Out of these, the element known as metalloid is R.

37. Question

Which of the following statement is correct in regard to the classification of elements ?

A. Elements in modern periodic table are arranged on the basis of increasing atomic masses.

B. Elements in Mendeleev's periodic table are arranged on the basis of increasing atomic numbers.

C. In Modern periodic table, the element nickel of lower atomic mass is kept before the element cobalt of higher atomic mass.

D. In modern periodic table, the isotopes of chlorine having different atomic masses are kept in the same group

Answer

Regarding to the classification of elements, **In modern periodic table, the isotopes of chlorine having different atomic masses are kept in the same group**

38. Question

Which of the following statement about the modern periodic table is correct?

A. It has 18 horizontal rows known as periods.

B. It has 7 vertical columns known as periods

C. It has 18 vertical columns known as groups.

D. It has 7 horizontal rows known as groups.

Answwr ||| C

Answer

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39. Question

An element X forms an oxide X_2O_3. In which group of Mendeleev's periodic table is this element placed ?

A. group II

B. group III

C. group V

D. group VIII

Answer

The element was placed in the third group of Mendeleev' periodic table.

40. Question

The modern periodic table was prepared by :

A. Dobereiner

B. Newland's

C. Bohr

D. Mendeleev

Answer

The modern periodic table was prepared by Bohr.

41. Question

The atomic particle whose number in the atoms of an element always remains the same and which forms the real basis for the modern classification of elements is :

A. electron

B. proton

C. neutron

D. meson

Answer

The atomic particle whose number in the atoms of an element always remains the same and which forms the real basis for the modern classification of elements is **Proton**.

Questions Based on High Order Thinking Skills (HOTS)-Pg-284

42. Question

The atomic masses of three elements X, Y and Z having similar chemical properties are 7, 23 and 39 respectively.

(a) Calculate the average atomic mass of elements X and Z.

(b) How does the average atomic mass of elements X an Z compare with the atomic mass of element Y ?

(c) Which law of classification of elements is illustrated by this example ?

(d) What could the elements X, Y and Z be ?

(e) Give another example of a set of element which can be classified according to this law.

Answer

(a) We have to calculate the average atomic mass of elements X and Z

Avg. atomic mass= Atomic mass of X + Atomic mass of Z

Avg. atomic mass= 7+39/2

Avg. atomic mass= 23

(b) The average atomic mass of elements X and Z is equal to the element Y.

So X, Y and Z elements follow the law of Doberenier's.

(c) The given elements follow the law of Doberenier.

(d) The atomic mass of X element is 7, so this element is Lithium. The atomic mass of Y element is 23, so this element is Sodium and the atomic mass of Z element is 39 so this element is Potassium.

(e) The three elements chlorine, bromine and iodine also follow the law of doberenier.

43. Question

In the following set of elements, one element does not belong to the set. Select this element and explain why it does not belong :

Calcium, Magnesium, Sodium, Beryllium

Answer

In the above elements Sodium does not belong to this group because Sodium belongs to the group of alkali metals and the rest three belong to the alkaline earth metals group.

44. Question

In the following set of elements, one element does not belong to the set. Select this element and state why it does not belong :

Oxygen, Nitrogen, Carbon, Chlorine, Fluorine.

Answer

From the given elements chlorine does not belong to the set because all the remaining elements belong to the 2^{nd} period of the modern periodic table but chlorine belongs to the 3^{rd} period.

45. Question

Can the following groups of elements be classified as Dobereiner's triads ?

(a) Na, Si, Cl

(b) Be, Mg, Ca

Give reason for your answer.

(Atomic masses : Be 9; Na 23; Mg 24; Si 28; Cl 35.5; Ca 40)

Answer

(a) Na, Si and Cl, these three elements have different physical as well as chemical properties so they do not belong to dobereiner's triads, even if the atomic mass of Si is equal to the arithmetic mean of atomic mass of Na and Cl.

(b) Be, Mg and Ca, these three elements have similar properties and the arithmetic mean of the atomic mass of Be and Ca is equal to the atomic mass of Mg. Therefore these elements belong to the Doberenier's Triads.

46. Question

Consider the following elements :

Na, Ca, Al, K, Mg, Li

(a) Which of these elements belong to the same period of the periodic table ?

(b) Which of these elements belong to the same group of the periodic table ?

Answer

(a) The elements Na, Mg and Al belong to the same period. They belong to the 2^{nd} period of the modern periodic table.

(b) The elements Li, Na and K belong to the same group, they belong to the first group of the modern periodic table.

47. Question

Which element has :

(a) two shells, both of which are completely filled with electrons ?

(b) the electronic configuration 2,8,2 ?

(c) a total of three shells, with four electrons in its valence shell ?

(d) a total of two shells, with three electrons in its valence shell ?

(e) twice as many electrons in its second shell as its first shell ?

Answer

(a) So in this electronic configuration there are three shells and there are 2 electrons in its last shell, so the total electrons are 12. So this element is Alluminium.

(b) The element which has two shells and both are completely filled with electrons is Neon. Neon has 2 electrons in its first shell and 8 electrons in the second.

(c) The element which has three shells and 4 electrons in its valence shell is Silicon.

(d) The element which has two shells and two electrons in its valence shell is Boron (2,3).

(e) As we know only 2 electrons can exist in the first shell, so it means there are 4 electrons in the valence shell of this element. Therefore this element is Carbon (2,4).

48. Question

Consider the following elements:

Ca, Cl, Na, I, Li, Ba, Sr, K, Br

Separate these elements into three groups (families) of similar properties. State one property in each on the basis of which you have made your choice.

Answer

Li, Na and K, these elements from the above elements are the alkali metals and they have 1 electron in its valence shell.

Ca, Sr and Ba, these three elements from the above elements are the alkaline earth metals and having 2 electrons in its valence shell.

Cl, Br and I, these elements from the above elements are the non metals and also termed as Halogens.

49. Question

Mendeleev predicted the existence of certain elements not known at that time and named two them as eka- aluminium, and eka-silicon.

(a) Name the element which has taken the place of (i) eka-aluminium, and (ii) eka-silicon.

(b) Mention the period/periods of these elements in the modern periodic table.

(c) Why is such a classification of elements compared with a characteristic of musical scale ?

(d) State one limitation of this classification of elements.

Answer

(a) (i) Gallium is the new element which has taken the place of eka – aluminium.

(ii) Germanium is the new element which has taken the place of eka silicon.

(b) These elements are placed in the 4^{th} period of the modern periodic table.

(c) As we know that in musical scale the eight notes are repeating so Newland compared it with the musical scale because in his law the property of the 1^{st} element is same as the 8^{th}.

(d) This classification of the element was only applicable to the Calcium.

Very Short Answer Type Questions-Pg-302

1. Question

Given alongside is a part of the periodic table : As we move horizontally from left to right :

(i) What happens to the metallic character of the elements ?

(ii) What happens to the atomic size ?

Answer

As we move horizontally from left to right the metallic character is decreasing.

The atomic size of the element is decreasing as we move from left to right.

Li	Be		B	C	N	O	F
Na	Mg		AI	Si	P	S	CI

2. Question

How would the tendency to gain electrons change on moving from left to right in a period of the periodic table ?

Answer

The tendency to gain electrons increases on moving from left to right in a period of the periodic table.

3. Question

How would the tendency to lose electrons change as we go from left to right across a period of the periodic table?

Answer

The tendency to lose electrons decreases as we go from left to right across a period of the periodic table.

4 A. Question

How does the chemical reactivity of alkali metals vary on going down 1 of the periodic table?

Answer

The alkali metals group is the first group of the periodic table so as we move top to dowm from lithium to francium the chemical reactivity increases.

4 B. Question

How does the chemical reactivity of the halogens vary on going down in group 17 of the periodic table ?

Answer

Group 17 is the group of halogen elements of the periodic table, as we move top to down in the group 17 of halogens the chemical reactivity decreases from fluorine to iodine.

5. Question

What property do all elements in the same column of the periodic table as born have in common ?

Answer

The property of valence electron is same in a group of periodic table, the number of valence electron in the last shell of the elements in a same group is same.

6. Question

What property do all the elements on the same group of the periodic table as fluorine have in common ?

Answer

Flourine belongs to the halogen family of the periodic table which comes in 17^{th} group. Flourine has 1 valence electron in its last shell so all the elements of the 17^{th} group have 1 valence electron in its last shell.

7 A. Question

What is the number of valance electrons in the atoms of first element in a period ?

Answer

One valence electron in the atoms of the first element in the period.

7 B. Question

What is the usual number of valence electrons in the atoms of the last element in a period ?

Answer

Usually 8 valence electrons are present in the atoms of the last element in a period.

8. Question

State whether the following statement is true or False :

On going down in a group of the periodic table, the number of valence electrons increases.

Answer

This statement is false because as we go down in a group of the periodic table the number of valence electrons in the last shell of the elements remain same.

9. Question

What is the major characteristic of the first elements in the periods of the periodic table ? What is the general name of such elements ?

Answer

The first elements in the periods of the modern periodic table are called the alkali metals and the major characterstic of the first elements in the periods of the table is that they have one valence electron in their last shell.

10. Question

How do the atomic radii of elements change as we go from left to right in a period of the periodic table ?

Answer

When we move left to right in a period of the periodic table the atomic radii of elements decreases.

11. Question

What happens to the metallic character of the elements as we go down in a group of the periodic table ?

Answer

The metallic character of the elements increases as we go down in a group of the periodic table.

12. Question

How does the number of valence electrons vary on moving from left to right :

(i) in the first period of the periodic table ?

(ii) in the second period of the periodic table

Answer

(i) In the first period of the periodic table when we move left to right the number of valence electron increases from 1 to 2.

(ii) In the second period of the periodic table when we move left to right the number of valence electron increases from 1 to 8.

13. Question

How does the valency of elements change on moving from left to right in the third period of the periodic table ?

Answer

As we move left to right in the third period of the periodic table the valency of the element increases from 1 to 4 then decreases to zero.

14. Question

How does the valency of elements vary in going down a group of the periodic table ?

Answer

When we move from top to bottom in any group of the modern periodic table the valency of all the elements in that group remains same.

15. Question

Name the element which is in :

(a) first group and third period

(b) seventeenth group and second period.

Answer

(a) The element in the first group and third period is Sodium.

(b) The element in the 17^{th} group and 2^{nd} period is Fluorine.

16. Question

How do electronic configurations of elements change in second period of periodic table with increase in atomic numbers ?

Answer

Electronic configuration of elements are as follows:

Lithium (2,1), Beryllium(2,2), Boron(2,3), Carbon(2,4), Nitrogen(2,5), Oxygen(2,6), Fluorine(2,7) and Neon(2,8).

17. Question

Arrange the following elements in increasing order of their atomic radii.

Li, Be, F, N

Answer

Here Flourine has the least atomic raddi then Nitrogen then Beryllium and Lithium has the largest atomic radii among these.

18. Question

Arrange the following elements in the in increasing order of their metallic character :

Mg, Ca, K, Ga

Answer

These are arranged as follows:-

Ga<Mg<Ca<K

19. Question

Rewrite the following statements after correction, if necessary :

(i) Elements in the same period have equal valency

(ii) The metallic character of elements in a period increases gradually on moving from left to right.

Answer

(i) This statement is wrong. The elements in the same group have equal valency.

(ii) This statement is wrong. The metallic character of elements in a period decreases gradually on moving from left to right.

20. Question

Fill in the blanks in the following statements :

(a) The horizontal rows ___

(b) In going across a period (right to left) in periodic table, the atomic size of the atom _____

(c) On moving from right to left in the second period, the number of valence electrons _____

(d) On going down in a group in the periodic table, the metallic character of elements _____

(e) The tendency to gain an electron _____ on moving down in a group of the periodic table.

Answer

(a) Periods

The horizontal rows are the **periods**.

(b) Increases

In going across a period (right to left) in periodic table, the atomic size of the atom **increases**.

(c)decreases

On moving from right to left in the second period, the number of valence electrons **decreases**.

(d) On going down in a group in the periodic table, the metallic character of elements **increases**.

(e)The tendency to gain an electron decreases on moving down in a group of the periodic table.

Short Answer Type Questions-Pg-303

21. Question

Nitrogen (atomic number 7) and phosphorus (atomic number 15) belong to group 15 of the periodic table. Write the electronic configurations of these two elements. Which of these will be more electronegative ?Why ?

Answer

Electronic Configuration of Nitrogen is (2,5) and Phosphorous is (2,8,5). Among these two nitrogen is more electronegative because nitrogen is

smaller in size so the attraction between the nucleus and the incoming electron of nitrogen is more.

22. Question

An element X belongs to group 2 and another element Y belong to group 15 of the periodic table :

(a) What is the number of valence electrons in X ?

(b) What is the valancy of X ?

(c) What is the number of valence electrons in Y ?

(d) What is the valancy of Y ?

Answer

(a) Electron X belongs to the group 2^{nd} of the alkali metals so the number of valence electrons in element X is 2.

(b) The valency of the element X is 2.

(c) The element belongs to the 15 group so the number of valence in Y is 5.

(d) Valency of electron Y is 5.

23 A. Question

What is a period in a periodic table ? How do atomic structures (electron arrangements) change in a period with increase in atomic numbers from left to right ?

Answer

Periods are the horizontal rows present in the periodic table. As we move from left to right in a period, the atomic number of elements increases which means that the no. of protons and electrons in the atom increases. Due to large positive charge on the nucleus, the electrons are pulled in more close to the nucleus and the size of the atom decreases.

23 B. Question

How do the following change on going from left to right in a period of the periodic table ?

(i) Chemical reactivity of elements

(ii) Nature of oxides of elements

Answer

(i) When we move left to right in a period of the periodic table the chemical reactivity of elements first decreases and then increases.

For example- In the 3rd period of elements, sodium is a very reactive element, magnesium is less reactive whereas aluminium is still less reactive. Silicon is the least reactive in the third period. Now, phosphorus is quite reactive, sulphur is still more reactive whereas chlorine is very reactive.

(ii) When we move from left to right in a period the nature of oxides of elements decreases and the acidic nature of oxides increases.

Example- In the 3rd period of the periodic table, sodium oxide is highly basic in nature and magnesium oxide is comparatively less basic. The aluminium and silicon oxides are amphoteric in nature. Phosphorus oxides are acidic, sulphur oxides are more acidic whereas chlorine oxides are highly acidic in nature.

24 A. Question

How does the size of atoms (atomic size) generally vary in going from left to right in a period of the periodic table ? Why does it vary this way ?

Answer

As we know that in modern periodic table the atomic number increases as we move from left to right in a period which means that the no. of protons and electrons also increases .When the amount of protons and electrons increases in the elements then the positive charge also increases in the nucleus of the elements, so nucleus pulls electrons and the size of the atom decreases.

24 B. Question

What happens to the metallic character of the elements as we move from left to right in a period of the periodic table ?

Answer

The metallic character of the elements decreases as we move from left to right in a period. In group 1 and 2 maximum amout of metals are placed in the modern periodic table.

25 A. Question

Explain why :

(i) All the elements of a group have similar chemical properties.

(ii) All the elements of a period have different chemical properties.

Answer

(i) All the elements of a group have similar chemical properties because the elements which are placed in a same group have same amount of electrons in its valence shell or we can say that the valency of the elements in a same group are same.

(ii) Periods are the horizontal rows present in the modern periodic table. So the elements which are present in the same periods have different valency that's why the chemical properties of the elements in a same period are different.

25 B. Question

The atomic radii of three elements X, Y and Z of a period of the periodic table are 186 pm; 104 pm and 143 pm respectively. Giving a reason, arrange these elements in the increasing order of atomic numbers in the period.

Answer

In the modern periodic table as we move in a periof left to right the atomic number of the element increases and the size of the atom is decreased.

X<Z<Y

These elements are arrange in this manner, X comes first because its atomic radii is greatest among these three and then Z and lastly Y is placed because it has least atomic radii among all.

26 A. Question

How does the electropositive character of elements change on going down in a group of the periodic table.'

Answer

The electropositive character of elements increases on going down in a group of periodic table because electro positivity means how muchelectrons an element can lose. so as we move down in a group the number of shell increases and more easily the element can lose electrons.

26 B. Question

State how the valency of elements various (i) in a group, and (ii) in a period, of the periodic table.

Answer

(i) In a group, the elements have same number of electron in its last shell so the valency of electrons in the group is same.

(ii) In a period as we move left to right, first the valency of the electron increases from 1 to 4 and then decreases to zero.

27 A. Question

What is the fundamental difference in the electronic configurations between the group 1 and group 2 elements ?

Answer

As we know that group 1 elements are called alkali metals and group 2 elements are called alkaline earth metals, in group 1 the number of valence electrons in the valence shell is 1 and in group 2 the electrons in valence shell are 2.

27 B. Question

On the basis of electronic configuration, how will you identify:

(i) chemically similar elements ?

(ii) the first element of a period ?

Answer

(i) The elements whose valence shell electrons are same, it means that those elements have similar chemical properties.

(ii) The first element can be identified by checking its valence shell electrons, elements which have 1 electron in their valence shell then these elements are the first element of the period.

28 A. Question

what is the usual number of valence electrons and valency of group 18 elements of the periodic table ?

Answer

the elemwants in the 18^{th} group of the periodic table are noble gases. So the valence electron in its shell is 8 and the valency is 0.

28 B. Question

What happens to the number of valence electrons in the atoms of elements as we go down in a group of the periodic table ?

Answer

As we move down in the group the valence electrons in the element of the same group is same.

29 A. Question

What is the main characteristic of the last elements in the periods of the periodic table ? What is the general name of such elements ?

Answer

The last element of the periodic table means the elements which are present in the 18^{th} group of the periodic table and as we know that the 18^{th} group elements are known as the noble gases. Except helium all the noble gases are filled with 8 electrons in their valence shell.

29 B. Question

What is the number of elements in : (a) 1^{st} period and (b) 3^{rd} period, of the modern periodic table ?

Answer

(a) Number of elements in the 1^{st} periods are 2.

(b) Number of elements in the 3^{rd} period are 8.

30 A. Question

How does the atomic size vary on going down from top to bottom in a group of the periodic table ? why does it change this way ?

Answer

As we move top to bottom in the group a new shell is added in every element so the atomic size of the element increases.

30 B. Question

Lithium, sodium and potassium are all metals that react with water to liberate hydrogen gas. Is there any similarity in th atoms of these elements? Explain your answer.

Answer

Lithium, sodium and potassium are the elements of the same group so the number of valence electron in their shell are same so these elements are similar in the chemical properties.

31 A. Question

How does the tendency to lose electrons change as we go down in group 1 of the periodic table ? Why does it change this way ?

Answer

As we move down in the group a new shell increases in every element of the group so as the shell is added the distance between the nucleus of the atom and the valence electron increases, so tendency of loosing electrons increases as we move down in a group.

31 B. Question

How does the tendency to gain electrons change as we go down in group 17 of the periodic table ? Why does it change this way ?

Answer

The tendency to gain electrons decreases as we move down in the group 17 because at every step the shell is included and because of this the distance between the nucleus and the valence electron increases and the size of atom increases.

32 A. Question

Why does the size of the atoms progressively become smaller when we move from sodium (Na) to chlorine (Cl) in the third period of the periodic table ?

Answer

The size of the atoms progressively become smaller when we move from sodium to chlorine in the third period of the periodic table because as we move left to right in a period the positive charge on the nucleus increases and tendency to pull the electron increases so the size decreases.

32 B. Question

Helium and neon are unreactive gases. What, If anything, do their atoms have in common ?

Answer

Both the elements are noble gases and the valence shell is fully filled with the valence electron.

33 A. Question

In the modern periodic Table, why does cobalt with higher atomic mass of 58.93 appear before nickel having lower atomic mass of58.71?

Answer

Cobalt comes first because as we know the modern periodic table is based on the increasing order of atomic number. So the atomic number of cobalt is 27 and nickel is 28. That's why cobalt comes first in the modern periodic table.

33 B. Question

Why could no fixed position be given to hydrogen in Mendeleev's periodic table ?

Answer

The position of hydrogen is a big issue in Mendeleev's periodic table, hydrogen is placed in the group of alkali metals because it also combines with halogens, oxygen and sulphar to form compounds having similar formulae.

Long Answer Type Questions-Pg-304

34 A. Question

What are the periods and group in a periodic table ? Give two characteristic of each.

Answer

In the periodic table, the horizontal rows of elements are called periods and the vertical rows of elements are called groups.

Characteristics of a Period:

i) Elements have consecutive atomic numbers.

ii) Number of elements in period is fixed a andhe maximum number of electrons which can be accommodated in various shells.

Characteristics of a Group:

i) Elements do not have consecutive atomic numbers.

ii) All elements have similar electronic configuration and show similar properties.

34 B. Question

In terms of electronic configurations, explain the variation in the size if the atoms of the elements belonging to the same period and same group.

Answer

In a Period, the atomic size of elements decreases as we move from left to right because the number of protons and electrons increases which results in the force of attraction leading to the reduction of size of atom.

While in a Group, the number of shells increases as we go down the group resulting in the increase of atomic size.

34 C. Question

Given alongside is a part of the periodic table. As we move vertically downward from Li to Fr :

(i) What happens to the size of atoms.

(ii) What happens to their metallic character ?

Answer

(i) Atomic size increases gradually from Lithium to Francium.

(ii) It increases from Lithium to Francium.

34 D. Question

Name two properties of the elements whose magnitude change when going from top to bottom in a group of periodic table. In what manner do they change ?

Answer

As we go down the group, the atomic size and the metallic character of elements increases. Thus, the size of atom increases from Lithium to Francium. Also, Lithium is least metallic while Fancium is the most metallic element.

34 E. Question

Rewrite the following statement after correction, if necessary :

Group have elements with consecutive atomic numbers.

Answer

This Statement is wrong. The correct statement is that Period have elements with consecutive atomic number.

Li	Be
Na	
K	
Rb	
Cs	
Fr	Ra

35 A. Question

Explain why, the first period of the modern periodic table has only two elements whereas second period has eight elements

Answer

The first period of the modern periodic table has only two elements because there are two elements in the first period Hydrogen and Helium. In these two elements there is only one shell present and it can only take two elements. Second period has 8 elements because it has 2 shells and 2^{nd} shell will not take electrons more than 8.

35 B. Question

Why do elements in the same group show similar properties but elements in different group show different properties ?

Answer

Elements in the same group have same number of electrons in their valence shell but the elements of different groups have different number of electrons in their valence shell.

35 C. Question

For each of the following triads, name the element with the characteristic specified below.

Elements	Least atomic radius	Chemical least reactive
(i) F, Cl, Br	----------	----------
(ii) Li, Na, K	----------	----------

Answer

(i) Among these three elements Flourine has least atomic radius and Bromine is chemically least reactive.

(ii) Among these three elements Lithium has least atomic radius and it is also least chemically reactive.

35 D. Question

State one reason for keeping fluorine and chlorine in the same group of the periodic table.

Answer

Both the elements Flourine and Chlorine are the halogens so they are in the group of halogens family and they both have 7 electrons in their valence shell so they are kept in the same group of periodic ttable.

35 E. Question

What are the merits of the modern periodic table of elements ?

Answer

(i) The main advantage that it shows that why elements in a group show similar properties and elements in different groups show different properties.

(ii) The modern periodic table is based on the increasing order of their atomic number.

36 A. Question

What is a group in the periodic table ? In which part of a group would you separately expect the elements to have (i) the greatest metallic character (ii)

the largest atomic size?

Answer

The elements which are present in the vertical column is called the group.

(i) The lowest part of the table have the greatest metallic character.

(ii) The lowest part of the table have the largest atomic size.

36 B. Question

In what respects do the properties of group 1 elements differ from those of group 17 elements ? Explain with example by taking one element from each group.

Answer

The elements present in the 1^{st} group of the periodic table have 1 electron in its valence shell.

For Example- Lithium has 1 electron in its valence shell.

The element present in the 17^{th} group have 7 electrons in its valence shell.

For example- Fluorine has 7 electrons in its valence shell.

36 C. Question

From the standpoint of atomic structure, what determines which element will be the first and which the last in a period of the periodic table?

Answer

which element will be the first and which will be the last is decided by checking the valence electron in its last shell.

36 D. Question

Explain why, the properties of elements are repeated after 2,8 18 an 32 elements in the periodic table.

Answer

This is the standard way of electronic configuration which is repeated after 2,8,18 and 32 elements in the periodic table. Hence the elements show similar properties.

36 E. Question

What are the advantage of the periodic table ?

Answer

The advantages of periodic table:-

(i) This periodic table makes the study of chemistry easy.

(ii) If the position of the element in the periodic table is known then it is easy to study about that element.

(iii) Compounds that are formed can be predicted by knowing the position of the elements.

Multiple Choice Questions (MCQs)-Pg-305

37. Question

Which of the following statements is not a correct statement about the trends when going from left to right across the periods of the periodic table?

A. The elements become less metallic in nature.

B. The number of valence electrons increase.

C. The atoms lose their electrons more easily

D. The oxides become more acidic.

Answer

The atoms lose their electrons more easily. This statement about the trends when going from left to right across the periods of the periodic table is not correct.

38. Question

The Electronic configuration of the atom of an element X is 2,8,4. In modern periodic table, the element X is placed in :

A. 2^{nd} group

B. 4^{th} group

C. 14^{th} group

D. 8^{th} group

Answer

The Electronic configuration of the atom of an element X is 2,8,4.In modern periodic table, the element X is placed in 14^{th} group.

39. Question

The atomic number of an element is 20. In modern periodic table, this element is placed in :

A. 2^{nd} period

B. 4^{th} period

C. 3^{rd} period

D. 1^{st} period

Answer

The atomic number of an element is 20. In modern periodic table, this element is placed in **4^{th} period.**

40. Question

Five elements A, B, C, D and E have atomic numbers of 2, 3, 7 10 and 18 respectively.The elements which belong to the same group of the periodic table is :

A. A, B, C

B. B, C, D

C. A, D, E

D. B, D, E

Answer

Five elements A,B,C,D and E have atomic numbers of 2,3,7 10 and 18 respectively.The elements which belong to the same group of the periodic table is B,C,D

41. Question

The elements A, B, C, D and E have atomic numbers 9, 11, 17, 12 and 13 respectively. The pair of elements which belongs to the same group of the periodic table is:

A. A and B

B. B and D

C. A and C

D. D and E

Answer

The elements A, B, C, D and E have atomic numbers 9, 11, 17, 12 and 13 respectively. The pair of elements which belongs to the same group of the periodic table is **A and C**.

42. Question

Which of the following element would lose an electron easily?

A. Mg

B. Na

C. K

D. Ca

Answer

Potassium would lose an electron easily.

43. Question

Which of the following element does not lose an electron easily?

A. Na

B. F

C. Mg

D. Al

Answer

Fluorine does not lose electron easily.

44. Question

Where would you locate the element with electronic configuration 2, 8 in the modern periodic table?

A. group 8

B. group 2

C. group 18

D. group 16

Answer

The element with electronic configuration 2, 8 in the modern periodic table is located in **group 18**

45. Question

An element which is an essential constituent of all organic compouds belongs to following group of modern periodic table:

A. group 4

B. group 14

C. group 15

D. group 16

Answer

An element which is an essential constituent of all organic compouds belongs to **group 14** of modern periodic table

46. Question

Which of the following is the valence shell for the elements of second period of the modern periodic table?

M shell

B. K shell

C. L shell

D. N shell

Answer

L shell is the valence shell for the elements of second period of the modern periodic table.

47. Question

The element which has the maximum number of valence electrons is:

A. Na

B. P

C. Si

D. Al

Answer

The element which has the maximum number of valence electrons is **P**.

48. Question

The correct increasing order of the atomic radii of the elements oxygen, fluorine and nitrogen is:

A. O, F, N

B. N, F, O

C. O, N, F

D. F, O, N

Answer

The correct increasing order of the atomic radii of the elements oxygen, fluorine and nitrogen is F, O, N.

49. Question

The atomic numbers of the elements Na, Mg, K and Ca are 11, 12, 19 and 20 respectively. The elements having the largest atomic radius is:

A. Mg

B. Na

C. K

D. Ca

Answer

The atomic numbers of the elements Na, Mg, K and Ca are 11, 12, 19 and 20 respectively. The elements having the largest atomic radius is K.

50. Question

Which of the following are the correct characteristics of isotopes of an element?

(i) same atomic mass

(ii) same atomic number

(iii) same physical properties

(iv) same chemical properties

A. (i), (ii) and (iv)

B. (ii), (iii) and (iv)

C. (ii) and (iii)

D. (ii) and (iv)

Answer

The correct characteristics of isotopes of an element is that they have **same atomic number and chemical properties**.

51. Question

The correct formula of the oxide of Eka-aluminium element predicted by Mendeleev was:

EaO_3

B. $Ea3O_2$

C. Ea_2O_3

D. EaO

Answer

The correct formula of the oxide of Eka-aluminium element predicted by Mendeleev was Ea_2O_3.

52. Question

The element which can form an acidic oxide should be the one whose atomic number is:

A. 6

B. 16

C. 12

D. 19

Answer

The element which can form an acidic oxide should be the one whose atomic number is 16.

53. Question

The element which forms a basic oxide has the atomic number of:

A. 18

B. 17

C. 14

D. 19

Answer

The element which forms a basic oxide has the atomic number of 19.

54. Question

Which one of the following does not increase while moving down the group of the periodic table?

A. atomic radius

B. metallic character

C. valence electrons

D. shells in the atoms

Answer

Valence electrons do not increase while moving down the group of the periodic table

55. Question

On moving from left to right in a period of the periodic table, the atomic number of elements increases. What happens to the size of atoms of elements on moving from left to right in a period?

A. increases

B. decreases

C. remains the same

D. first increases then decreases

Answer

On moving from left to right in a period of the periodic table, the atomic number of elements increases. The size of atoms of elements on moving from left to right in a period is decreases.

56. Question

Which of the following set of elements is written correctly in the order of their increasing metallic character?

A. Mg, Al, Si

B. C, O, N

C. Na, Li, K

D. Be, Mg, Ca

Answer

Be, Mg, Ca, This set of elements is written correctly in the order of their increasing metallic character.

Questions Based on High Order Thinking Skills (HOTS)-Pg-306

57. Question

The atomic numbers of the three elements X, Y and Z are 2, 6 and 10 respectively.

(i) Which two elements belong to the same group?

(ii) Which two elements belongs to the same period?

Give reasons for your choice.

Answer

(i) X and Z elements have atomic number 2 and 10. They have0 valency so they belong to the group of noble gas.

(iii) Y and Z have two valence electrons in their last shell so they belongs to the same period.

58. Question

An atom has the electron structure of 2, 7.

(a) What is the atomic number of this atoms?

(b) To which of the following would it be chemically similar?

$_{7}N$, $_{15}P$, $_{17}Cl$, $_{18}Ar$

(c) Why would you expect it to be similar?

Answer

(a) The election structure is (2,7) so we have to add these electrons to get the atomic number. Therefore the atomic number is 9.

(b) Chlorine which has atomic number 17 is chemically similar.

(c) They expect to be similar because both have same number of valence electron 7.

59. Question

Consider the following elements:

$_{20}Ca$, $_{8}O$, $_{18}Ar$, $_{16}S$, $_{4}Be$, $_{2}He$

Which of the above elements would you expect to be:

(i) Very stable?

(ii) In group 2 of the periodic table?

(iii) In group 16 of the periodic table?

Answer

(i) Argon and Hellium are the most stable among these all.

(ii) Calcium and Beryllium have 2 valence electrons so they belong to 2^{nd} group.

(iii) Oxygen and Sulphar have 6 valence electrons so the belong to 16 group.

60. Question

In each of the following pairs, choose the atom having the bigger size:

(a) Mg (At. No. 12) or Cl(At. No. 17)

(b) Na (At. N0. 11) or K (At. No. 19)

Answer

(a) Mg is bigger in size because as we move left to right in period the atomic size decreases.

(b) K is bigger in size because as we move down the group the atomic size increases.

61. Question

The atomic numbers of three elements A, B and C are given below:

Element	Atomic number
A	5
B	7
C	10

(i) Which element belongs to group 18?

(ii) Which element belongs to group 15?

(iii) Which element belongs to group 13?

(iv) To which period/periods do these elements belongs?

Answer

(i) Element C belongs to group 10 because it has 8 elements in the last shell and its valency is 0.

(ii) elements belongs to group 15 because it has 5 electrons in its last shell.

(iii) an element belongs to the group 13 because it has 3 electron in its valence shell.

(iv) These elements belong to the 2^{nd} period because all the 2 shells are filled.

62. Question

An element X belongs to 3^{rd} period and group 2 of the periodic table State:

(a) number of Valence electrons

(b) Valency

(c) metal or non-metal

(d) name of the element

Answer

(a) This Element X has 2 valence electrons.

(b) The valency of X element is 2.

(c) The element X is metal.

(d) Element X is known as Magnesium.

63. Question

The following diagram shows a part of the periodic table in which the elements are arranged according to their atomic numbers. (The letters given here are not the chemical symbols of the elements):

a 3	b 4		c 5	d 6	e 7	f 8	g 9	h 10
i 11	j 12		k 13	l 14	m 15	n 16	o 17	p 18

(i) Which element has a bigger atom, a or f?

(ii) Which element has a higher valency, k or o?

(iii) Which element is more metallic, i or k?

(iv) Which element is more non-metallic, d or g?

(v) Select a letter which represents a metal of valency 2.

(vi) Select a letter which represents a non-metal of valency 2.

Answer

(i) an element has a bigger atom because when we move left to right the size of the atom decreases.

(ii)The valency of o element is 1 and k element is 3.

(iii) When we move from left to right the metallic character decreases, so element i is more metallic.

(iv) When we move left to right in the period then the non- metallic character increases, so element g is more non metallic.

(v) letter b represents a metal of valency 2.

(vi) letter f represents a non metal of valency 2.

64. Question

An element X is in group 2 of the periodic table:

(a) What will be the formula of its chloride?

(b) What will be the formula of its oxide?

Answer

(a) The formula of its chloride is XCl_2 because it has two electrons in its valence shell.

(b) The formula of its oxide is XO.

65. Question

An element Y is in second period and group 16 of the periodic table:

(i) Is it a metal or non-metal?

(ii) What is the number of valence electrons in its atom?

(iii) What is its valency?

(iv) What is the name of the element?

(v) What will be the formula of the compound formed by Y with sodium?

Answer

(i) This metal is surely non metal because metals are represented in the left side of periodic table.

(ii) Its electronic configuration is (2,6), so it has 6 valence electrons.

(iii) It has 6 electrons in its valence shell therefore the valency is 2.

(iv) The element which has configuration (2,6) is Oxygen.

(v) The formula with sodium id Na2Y.

66 A. Question

An element X has mass number 40 and contains 21 neutrons in its atom. To which group of the periodic table does it belongs?

Answer

This element X belongs to the 1^{st} group of the periodic table. The electronic configuration is (2,8,8,1) of this element.

66 B. Question

The element X forms a compound X_2Y. Suggest an element that Y might be and give reasons for your choice.

Answer

The element is Oxygen because X element is monovalent and Y has to be divalent to form compound X2Y.

67. Question

An element X combines with oxygen to form an oxide XO. This oxide is electrically conducting.

(a) How many electrons would be there in the outermost shell of the element X?

(b) To which group of the periodic table does the element X belong?

(c) Write the formula of the compound formed when X reacts with chlorine.

Answer

(a) 2 electrons would be there in the outermost shell of the element X.

(b) Group 2 of the periodic table does the element X belong.

(c) The formula of the compound formed when X reacts with chlorine is XCl2.

68. Question

An element A has an atomic number of 6. Another element B has 17 electrons in its one neutral atom.

(a) In which groups of the periodic table would you expect to find these elements?

(b) What type of bond is formed between A and B?

(c) Suggest a formula of the compound formed between A and B.

Answer

(a) The element A is present in group 14 and the element B is present in group 17.

(b) Covalent bond is formed between A and B

(c) The formula should be AB4 of this compound.

69. Question

The elements A, B, C and D belong to groups 1, 2, 14 and 17 respectively of the periodic table. Which of the following pairs of elements would produce a covalent bond?

(i) A and D

(ii) C and D

(iii)A and B

(iv)B and C

(v)A and C

Answer

(ii)

Element C and D produce a covalent bond.

70. Question

An element X from group 2 reacts with element Y from group 16 of the periodic table.

(a)What is the formula of the compound formed?

(b) What is the nature of bond in the compound formed?

Answer

(a) The formula should be XY of the compound.

(b) The nature of bond in the compound formed is Ionic bond.

71. Question

A metal X is in the first group of the periodic table. What will be the formula of its oxide?

Answer

In the first group of the periodic table there is only one electron in the last shell of the elements, hence valency of 1^{st} group element is 1. So they react with oxygen which have valency 2.

The formula will be X2O.

72. Question

An element A from group 14 of the periodic table combines with an element B from group 16.

(i) What type of chemical bond is formed?

(ii) Give the formula of the compound formed.

Answer

(i) The element A and element B are the two non metals. Therefore covalent bonds are formed between the two non metals.

(ii) The formul should be AB2.

73. Question

An element X from group 2 of the periodic table reacts with an element Y from group 17 to from a compound.

(a) What is the nature of the compound formed.

(b) State whether the compound formed will conduct electricity or not.

(c) Give the formula of the compound formed.

(d) What is the valency of element X?

(e) How many electrons are there in the outermost shell of an atom of element Y?

Answer

(a) The nature of the compound is Ionic.

(b) The compound formed will conduct electricity.

(c) The formula should be XY2.

(d) The valency of the element X is 2 because it belongs to the second group of the periodic table.

(e) The Y element belongs to 17^{th} group so there are 7 electrons in the outermost shell.

74. Question

The following diagram shows a part of the periodic table containing first three periods in which five elements have been represented by the letters a, b, c, d and e (which are not their chemical symbols):

1							18
A	2	13	14	15	16	17	
		b					c
d						e	

(i)Select the letter which representsan alkali metal.

(ii) Select the letter which represents a noble gas.

(iii) Select the letter which represents a halogen.

(iv) What type of bond is formed between a and e?

(v) What type of bond is formed between d and e?

Answer

(i) the letter d which representsan alkali metal

(ii) the letter c which represents a noble gas

(iii) the letter e which represents a halogen

(iv) The bond formed between a and e is a covalent bond.

(v) The bond formed between d and e is ionic bond.

75. Question

The elements A, B and C belongs to groups 1, 14 and 17 repectively of the periodic table.

(a) Which two elements will form a covalent compound?

(b) Which two elements will form an ionic compound?

Answer

(a) The two elements B and C will form a covalent compound.

(b) Two elements A and C will form an ionic compound.

76. Question

Find the neutral atom in the periodic table which has the same number of electrons as K+ and Cl-. What is this number?

Answer

The neutral atom in the periodic table which has the same number of electrons as K+ and Cl- is Argon atoms. Argon atoms have 18 electrons.

77. Question

Atoms of eight elements A, B, C, D, E, F, G and H have the same number of electron shells but different number of electrons in their outermost shells. It was found that elements A and G combine to form an ionic compound. This ionic compound is added in a small amount to almost all vegetables and dishes during cooking. Oxides of elements A and B are basic in nature while those of elements E and F are acidic. The oxide of element D is, However, almost neutral. Based on the above information, answer the following questions:

(a) To which group or period of the periodic table do these elements belongs?

(b) What would be the nature of compound formed by a combination of elements B and F?

(c) Which two of these elements could definitely be metals?

(d) Which one of the eight elements is most likely to be found in gaseous state at room temperature?

(e) If the number of electrons in the outermost shell of elements C and G be 3 and 7 respectively, write the formula of the compound formed by the combination of C and G.

Answer

(a) These elements belong to the 3^{rd} period of the periodic table.

(b) The nature of compound formed by a combination of elements B and F is Ionic Compound.

(c) Elements A and Elements B could definitely be metals.

(d) H element is most likely to be found in gaseous state at room tempreture.

(e) The formula of the compound formed by the combination of C and G is CG2.

78. Question

Write the names and symbols of two very reactive metals belonging to group 1 of the periodic table. Explain by drawing electronic structure, how either one of the two metals reacts with a halogen. With which name is the bond formed between these elements known and what is the class of the compound so formed known? State any four physical properties of such compounds.

Answer

The two very reactive metals are sodium (Na) and Potassium(K) belonging to group 1 of the Periodic Table.

Sodium is a reactive metal, it react with halogen to form an ionic chloride called sodium chloride.

$$2Na\,(s) + Cl_2\,(g) \longrightarrow 2NaCl\,(s)$$

Sodium	Chlorine	Sodium chloride
(A metal)		(Ionic chloride)

The bond formed in this compound is ionic bond and the compound is called as ionic compound.

The physical properties of Ionic Compounds are:-

(i) These compounds are hard and brittle.

(ii) They can conduct electricity

(iii) The melting and boiling point of this compound is high.

(iv) Most of the ionic compound are soluble in water.

79. Question

The non-metal A is an important constituent of our food and most of the fuels around us. A forms two oxides B and C. The oxide B is poisonous whereas oxide C causes global warming.

(a) Identify A, B and C

(b) To which group of periodic table does A belong?

(c) Name another element which is placed in the same group as A.

Answer

(a) A is Carbon(C), B is Carbon monoxide(CO) and C is carbon dioxide (CO_2).

(b) A belongs to the 14^{th} group of the periodic table.

(c) Silicon can be placed in place of A.

80. Question

A non-metal X which is the largest constituent of air combines with hydrogen when heated in the presence of iron as catalyst to form a gas Y. When gas Y is treated with sulphuric acid, it forms a compound Z which is used as a chemical fertilizer.

(a) What are X, Y and Z?

(b) To which group of periodic table does X belong?

(c) Name the period of periodic table in which X is placed.

(d) Which element is placed just before X in the period?

(e) Which element is placed just after X in the period?

Answer

(a) X is Nitrogen Gas (N_2), Y is Ammonia (NH_3) and Z is ammonium sulphate $(NH_4)_2SO_4$.

(b) X belongs to the 15^{th} group of the periodic table.

(c) X is placed in 2^{nd} period of the periodic table .

(d) Carbon is placed just before X in the Period

(e) Oxygen is placed just after X in the period.