Exercise :5 C

1. Element P has atomic number 19. To which aroup and period. does P belong ? It is a metal or a non-metal ? Why?

Solution:

Group no. of the element = 1A
Period no. of the element = 4
P is metal because The row number where you find that element is the period. The number at the top of the column is the group number. Elements to the left in the table are metals and to the right are non-metals.

2. An element belongs to the --rd period and Group III A(13) of the periodic table. State
(a) the number of valence electrons.
(b) the valency,
(c) if it is a metal or non-metal
(d) the name of the element.

Solution:

a) 3
b) +3
c) Metal
d) Aluminium

3. Name or state the following with reference to the element of the first three periods of the periodic table.
(a) Noble gas with duplet arrangement of electrons.
(b) Metalloid in Period 3. (
c) Valency of elements in Group 14 and 15.
(d) Noble has having electronic configuration 2, 8, 8.
(e) Group whose elements have zero valency.
(f) A covalent compound formed by an element in p 2 and a halogen.
(g) Non-metallic element present in Period 3 of Groups 15 and 16.
(h) An electrovalent compound formed by an alkaline earth metal and a halogen.
(i) Bridge elements of Period 3 of Group 1, 2 and 3,
(j) Alkali metal in Period 3 that dissolves in water giving a strong alkali.
(k) Typical elements of Groups 14 and 15.
(1) Alkaline earth metal in Period 3.

Solution:

a) Helium
b) Silicon
c) 4, 3
d) Argon
e) Noble gases
f) Carbon tetrachloride (CCl_4)
g) Silicon, Phosphorus
h) Sodium chloride (Na^+Cl^-)
i) Li and Mg; Be and Al; B and Si
j) Sodium
k) Typical elements of Period 2 belonging to Group 14 and 15 are carbon and nitrogen.
Typical elements of Period 3 belonging to Group 14 to 15 are silicon and phosphorus.
l) Beryllium

4. Match the Column A with Column B

Column A	Column B
a) Elements short by 1 electron in octet	i) Transition elements
b) Highly reactive metals	ii) Noble gases
c) Non-reactive elements	iii) Alkali metals
d) Elements of groups 3 to 12	iv) Alkaline earth metals
e) Radioactive elements	v) Halogens
f) Elements with 2 electrons in the ourtmost orbit.	vi) Actinides

Solution:

Column A	Column B
a) Elements short by 1 electron in octet	v) Halogens
b) Highly reactive metals	iii) Alkali metals
c) Non-reactive elements	i) Transition elements
d) Elements of groups 3 to 12	vi) Actinides
e) Radioactive elements	v) Halogens
f) Elements with 2 electrons in the outermost orbit.	iv) Alkaline earth metals

5. Complete the table

Atomic No	Element	Electronic configuration	Select element of the same group
11	**Sodium**	**…….**	**(Ca/N/K……)**
15	**Phosphorus**	**……**	**(Al/N/C……)**
16	**Sulphur**	**……...**	**(F/Cl/O.....)**
9	**Fluorine**	**……..**	**(Ca/Cl/K) .....)**

Solution:

Atomic No	Element	Electronic configuration	Select element of the same group
11	Sodium	2, 8, 1	K
15	Phosphorus	2, 8,5	N
16	Sulphur	2,8,6	O
9	Fluorine	2,7	Cl

6) Write down the word that will correctly complete the following sentences:

a) Ralative atomic mass of a light element up to calcium is approximately..... its atomic number.
b) The horizontal rows in a periodic table are called ……
c) Going across a period left to right, atomic size……..
d) Moving left to right in the second period, number of valence electrons…….
e) Moving down in the second group, number of valence electrons ……

Solution:

a) Relative atomic mass of a light element up to calcium is approximately **20** its atomic number.
b) The horizontal rows in a periodic table are called **periods**.
c) Going across a period left to right, atomic size **increases**.
d) Moving left to the right in the second period, the number of valence electrons **increases from 1 to 8**.
e) Moving down in the second group, the number of valence electrons **remains the same**.

7) (a) Name the alkali metals. How many electron (s) do they have in their outermost orbit.
b) Take any one alkali metal and write its reaction with i) Oxygen ii) Water iii) Acid

Solution:

a) Lithium, sodium, potassium, rubidium, cesium, and francium are alkali metals. They have +1 electron in their outermost orbit.

b)
i) Reaction of alkali metal with oxygen - React rapidly with oxygen

$4Na + O_2 \rightarrow 2Na_2O$

ii) Reaction of alkali metal with water - React with water violently and produce hydrogen

$2M + 2H_2O \rightarrow 2MOH + H_2$

iii) Reaction of alkali metal with acid - React violently with dil. HCl and dil. H_2SO_4 to produce hydrogen

$2M + 2HCl \rightarrow 2MCl + H_2$

8. a) Name the method by which alkali metals can be extracted.
b) What is the colour of the flame of Sodium and Potassium?

Solution:

a) Alkali metals can be extracted by electrolysis of their molten state.

b) The color of the flame of sodium is golden yellow, and the colour of the flame of potassium is pale violet.

9. An element A has 2 electrons in its, fourth shell. State
a) its atomic number
b) its electronic configuration
c) its valency
d) position in the periodic table
e) is it a metal or a non-metal
f) is it an oxidizing or reducing agent?

Solution:

a) 20
b) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
c) 2
d) Group 2 Period 4
e) Metal
f) Reducing agent

10. (a) Name the first three alkaline earth metals.
(b) Write their reactions with dil hydrochloric acid.

Solution:

a) Beryllium, Magnesium and Calcium.

b) $Be + 2HCl \rightarrow BeCl_2 + H_2$
$Mg + 2HCl \rightarrow MgCl_2 + H_2$
$Ca + 2HCl \rightarrow CaCl_2 + H_2$

11.
(a) How do alkaline earth metals occur in nature?
(b) Write the electronic configuration of the first two alkaline earth metals.

Solution:

a) In nature earth metals occur in the combined state as they are very reactive metals.

b)
4Be: $1s^2 2s^2$
12Mg: $1s^2 2s^2 2p^6 3s^2$

12. Give reasons.
(a) Alkali metals are kept in inert solvent.
(b) Alkali metals and halogens do not occur free in nature.
(c) .Alkali and alkaline earth metal compounds usually form electrovalent compounds.
(d) Inert gases do not form compounds

Solution:

a) Alkali metals are kept in inert solvent because they are very reactive metals.
b)) Alkali metals and halogens do not occur free in nature because they are very reactive.
c) Alkali and alkaline earth metal have 1 and 2 in their valence shells hence they form electrovalent compounds.
d) Outmost orbits of inert gases are fully filled hence they do not form compound .

13. Arrange the following
(a) Elements of group 1, in increasing order of reactivity.
(b) Elements of group 17, in decreasing order of reactivity.
(c) He, Na, Mg (increasing order of melting point).
(d) Chlorine, sodium, magnesium (increasing reducing character).

Solution:

a) Li < Na < K < Rb < Cs
b) F > Cl > Br > I
c) He < Na < Mg
d) Cl < Mg < Na

14. (a) State the nature of compounds formed when group 17 elements combine with (i) metals (ii) non-metals.
(b) Why group 17 elements are highly reactive?

Solution:

a)
i) When group 17 elements combine with metals metal halides are formed.

ii) When group 17 elements combine with nonmetals compounds such as hydrogen halides are formed.

b) Group 17 elements are highly reactive because of their closeness to a stable configuration.

15. (a) How many electrons do inert gases have in their valence shells?
(b) Name an element of group 18 which can form compounds.

Solution:

a) 8 electron

b) Xenon or krypton from Group 18 can form compounds.

16. Name the gas used in
(a) filling balloons
(b) light bulbs
(c) bright coloured advertising light works

Solution:

a) Helium
b) Argon
c) Neon

17. (a) What is the name given to group 17 elements ? Why are they called so ?
(b) Comment on the (i) reactivity (ii) colour and (iii) physical state of group 17 elements.

Solution:

a) Group 17 elements are called halogens. The name halogens are from Greek halo (sea salt) and gens (producing, forming) and thus means 'sea salt former'. Group 17 consists of fluorine, chlorine, bromine, iodine which form salts. Hence they are called as Halogens.

b)

i) Reactivity: Halogens are the most reactive non-metals; their reactivity decreases down the group. Fluorine is the most reactive halogen, and iodine is the least reactive halogen.
ii) Colour: Fluorine is a pale yellow gas, chlorine is a greenish-yellow gas, bromine is a reddish-brown liquid and iodine is a violet solid.
iii) Physical state: Gaseous

18. Two elements P' and `Q' belong to the same period of the modern periodic table and are in group 1 and group 2 respectively. Compare the following characteristics in tabular form.
(a) number of electrons in their atoms.
(b) their tendency to lose electrons.
(c) their metallic characters.
(d) formation of their oxides.
(e) formulae of their chlorides.

Solution:

These elements belong to alkali metals and alkaline earth metals, respectively. Below are some of their characteristics.

Characteristic	Alkali metals (Element P)	Alkaline earth metals (Element Q)
(a) Number of electrons in their atoms	1	2
(b) their tendency to lose electrons.	Can easily lose electrons	lose electrons easily but not as easily as alkali metals can.
(c) their metallic characters.	P is more metallic	Q is less metallic than P
(d) formation of their oxides.	React rapidly with oxygen in air	Less reactive than alkali metals
(e) formulae of their chlorides.	NaCl, KCl, CsCl	$MgCl_2$, $CaCl_2$, $BaCl_2$