

Dear Students,

This set is based on – **Classification of Elements and periodicity in their properties** – that is **Periodic Table**. It is expected that you solve most of the following problems without referring to your notes. So it will be advisable to revise Periodic Table thoroughly before attempting this set. You may use class notes and the books that you have for revision. If you are stuck even after doing revision, do refer to your notes but do not forget to revise the ‘tricky’ portions again.

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**1. Answer the following.**

- Which is the longest period in long form of periodic table?
- Which is the shortest period in long form of periodic table?
- Which elements has the highest ionization enthalpy value?
- Name three elements that in liquid state.

**2. Arrange the following in increasing order of the property indicated.**

- F, Cl, Br and I ( electron gain enthalpy )
- $Mg^{2+}$ ,  $O^{2-}$ ,  $Na^+$ ,  $F^-$  and  $N^{3-}$  (ionic size)
- $Cl^-$ ,  $S^{2-}$ ,  $Ca^{2+}$  and Ar (size)
- Mg, Al, Si and Na (ionisation enthalpy)
- $Br^+$ ,  $Br$  and  $Br^-$  (size)
- $Pb$ ,  $Pb^{2+}$  and  $Pb^{4+}$  (size)
- HCl, HF, HI and HBr (acid strength)
- $I_2$ ,  $F_2$ ,  $Br_2$  and  $Cl_2$  (reactivity )
- Li, Be and B (ionisation enthalpy)
- $SiO_2$ ,  $P_2O_5$ ,  $SO_3$  and  $Cl_2O_7$  (acidic) nature)
- F, Cl, Br and I (electronegativity)
- Na, Cu and Zn (electropositive character)
- Na, Al, Fe and Pb (density)
- C, N, O and F ( $2^{nd}$  ionisation enthalpy)

**3. With reference to periodic table, indicate:**

- An element that is in group IIIA and third period.

- (ii) An element with an atomic number greater than 16 and chemically similar to the element with atomic number 10.
- (iii) First transition element of fourth period.
- (iv) The inert gases placed in the 2<sup>nd</sup> and 5<sup>th</sup> period.
- (v) The group which accommodates lanthanides and actinides.
- (vi) The group all members of which are metals.
- (vii) Position of most electropositive element.
- (viii) Position of most electronegative element.
- (ix) The group to which most abundant element belongs.
- (x) The group of s-block elements.

4. (a) Group the following elements (atomic numbers given) into various blocks noted below:

12, 19, 17, 25, 31, 42, 54, 23, 48

(i) s-block      (ii) p-block      (iii) d-block

(b) Which of the following are transition elements?

K, Mn, Ca, Cs, Fe, Cu, Pb

(c) In how many blocks have the elements of long form of periodic table been divided? Name them.

(d) The electronic configurations of some of the elements are given below. Identify them.

(A)  $1s^2, 2s^2, 3s^2$       (B)  $1s^2, 2s^2, 2p^6$       (C)  $1s^2, 2s^2, 2p^3$       (D)  $1s^2, 2s^2, 2p^6, 3s^1$       (E)  $1s^2, 2s^2, 2p^5$

5. (A) From among the elements, choose elements satisfying conditions given below.

Cl, Br, F, O, Al, C, Li, Sc and Xe

- (i) The element with highest electron gain enthalpy.
- (ii) The element with lowest ionisation enthalpy.
- (iii) The element whose oxide is amphoteric.
- (iv) The element which has smallest radius.
- (v) The element whose atom has 6 electrons in the outermost shell.
- (vi) The element which belongs to zero group.
- (vii) The element which forms largest number compounds.
- (viii) The element which shows diagonal relationship with Mg.
- (ix) The element which is in liquid state under ordinary atmospheric conditions.

(B) The elements Na, Mg, Al, Si, P, S, Cl and Ar are arranged in the periodic table in the increasing order of their atomic number.

- (i) Which element is the most electronegative?
- (ii) Which element is the most electropositive?
- (iii) Which element is the least reactive?
- (iv) Which elements are gases at room temperature?

- (v) Which element is the most abundant metal?
- (vi) Which element is the strongest oxidising agent?
- (vii) Which element has the given electronic configuration?  $1s^2, 2s^2 2p^6, 3s^2 3p_x^1 3p_y^1 3p_z^1$
- (viii) Which element shows +6 oxidation state?

(C) Pick up from the elements Na, Cl, Si and Ar.

- (i) The element with highest ionisation enthalpy.
- (ii) The element with highest electron gain enthalpy.
- (iii) The element with smallest size.
- (iv) The element with largest radius.
- (v) The element with lowest ionisation enthalpy.

(D) A, B and C are the elements of a short period of a periodic table containing one, two, and three electrons in their outermost shell, respectively.

Arrange A, B and C in the increasing order of :

- (i) Their ionisation enthalpy
- (ii) Basic character of their oxides
- (iii) Covalent character in their chlorides and
- (iv) Melting points of their chlorides.

## 6. Answer the following.

- (a) Give the electronic configuration of third alkali
- (b) Give the electronic configuration of fifth element of first transition series.
- (c) Give the electronic configuration of ninth element of first transition series.
- (d) Give the names and atomic numbers of the first and last members of the lanthanide series.
- (e) Give the names and atomic numbers of the first and last members of the actinide series.
- (f) Name of the groups of elements classified as s-, p- and d-block.
- (g) In terms of electronic configuration, what do elements of a given period and a group have in common?
- (h) Name the groups whose elements are called representative elements.
- (i) Write the general electronic configuration of s-, p-, d- and f- block elements.
- (j) In a period of normal elements, which element has lowest ionisation enthalpy and which element has highest ionisation enthalpy?

## 7. Explain.

- (a)  $Mg^{2+}$  ion is smaller than  $O^{2-}$  ion although both have same electronic configuration.
- (b) Nitrogen has slightly positive electron gain enthalpy.

(c) Sulphur has more negative electron gain enthalpy than oxygen.

**8. Predict the formulae of stable binary compounds that would be formed by the following pairs of elements.**

(a) element 114 and fluorine

(b) element 120 and oxygen

**9. Write short notes on the following.**

- (i) Dobereiner's triads
- (ii) Law of octaves
- (ii) Lothar Meyer's curve
- (iv) The periodic law
- (v) Groups and periods in extended form of periodic table
- (vii) Representative elements
- (viii) Transition elements
- (ix) Defects of Mendeleev's periodic table
- (x) Merits of extended form of periodic table
- (xi) Isoelectronic species
- (xii) Screening effect
- (xiii) Effective nuclear charge
- (xiv) Ionisation enthalpy
- (xv) Electron gain enthalpy
- (xvi) Electronegativity
- (xvii) Covalent radii
- (xviii) Ionic radii

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**Documentary of the Week:**

Do watch <http://www.youtube.com/watch?v=s7xxMX4Ovig> to get a brief account of some of the important discoveries in chemistry. This film gives glimpses of discoveries from oxygen to plastic. Parental guidance is required.

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