Classification of Elements

IIT & AIIMS Foundation Course

EXERCISE

Multiple Choice Questions

1. Elements were classified into metals and non-metals by
(a) Lavoisier (b) Dobereiner
(c) Newland (d) Faraday

2. The scientist who introduced law of triad is
(a) Lavoisier (b) Dobereiner
(c) Newland (d) Mendeleev

3. Law of octaves was proposed by
(a) Lavoisier (b) Dobereiner
(c) Newland (d) Mendeleev

4. In 1869, Mendeleev formulated a law, which states that the properties of elements are periodic functions of their atomic masses. It is known as
(a) periodic law (b) law of octaves
(c) law of triads (d) none of these

5. According to Mendeleev's periodic law, the properties of elements are a periodic function of their
(a) atomic numbers (b) atomic masses
(c) atomic volume (d) atomic sizes

6. According to modern periodic law, the properties of elements are a periodic functions of their
(a) atomic masses (b) atomic volumes
(c) atomic numbers (d) densities

7. Atomic number, not atomic mass is a more fundamental property of an element. This was enunciated by
(a) Lother Meyer (b) Moseley
(c) Mendeleev (d) Bohr

8. The vertical columns in a periodic table are called
(a) periods (b) groups
(c) lines (d) row

9. The ores of an element 'X' generally found in earth crust and ifs oxide gives strong alkali. Then 'X' belongs to
(a) I group (b) II group
(c) III group (d) IV group

10. Third period of the periodic table contains the following number of elements
(a) 2 (b) 18
(c) 8 (d) 32

11. Eka-boron predicted by Mendeleev, was named as ..... after ifs discovery.
(a) scandium (b) gallium
(c) germanium (d) boron

12. The first group elements are called
(a) alkali metals
(b) alkaline earth metals
(c) noble gases (d) halogens

13. The elements which have incomplete penultimate shell are
(a) representative elements
(b) noble gases (c) actinides
(d) transition elements

14. The element in which electronic configuration ends with p-subshell is called
(a) s-block element (b) p-block element
(c) d-block element (d) transition element

15. The elements of group 18 are called
(a) halogens (b) noble gases
(c) chalcogens
(d) alkaline earth metals

16. The elements of the group 16 are called.....
(a) halogens (b) noble gases
(c) chalcogens
(d) alkaline earth metals

17. The atoms of elements belonging to the same group of periodic table have the same
(a) number of protons
(b) number of electrons
(c) number of neutrons
(d) number of electrons in the outermost shell

18. Which amongst the following is not an alkaline earth metal?
(a) Mg (b) Ba
(c) Fr (d) Sr

19. Which amongst the following is not a noble gas?
(a) Helium (b) Neon
(c) Radium (d) Radon

20. From top to bottom in a group of periodic table the electropositive character of an element
(a) increases (b) decreases
(c) remain unchanged (d) changes irregularly

21. Arrange the following elements in the order of their increasing atomic size
(a) $F < Cl < Br < I$ (b) $F < I < Br < Cl$
(c) $Cl < F < I < Br$ (d) $I < Br < F < Cl$

22. Which of the following statements about the modem periodic table is correct?
(a) 18 horizontal rows are called periods
(b) 18 vertical columns are called groups
(c) 7 vertical columns are called periods

(d) 7 horizontal rows are called groups

23. Which one of the following element is chalcogen?
(a) Te (b) I
(c) Sb (d) Bi

24. From left to right in a period, the acidic nature in the oxides of elements is
(a) decreases (b) increases
(c) doesn't change (d) irregular change

25. On moving from left to right in period
(a) size of atom decreases
(b) metallic character decreases
(c) electropositive character decreases
(d) all of these

26. Which of the following is the lightest metal?
(a) Li (b) Mg
(c) Na (d) Ca

27. Which one of the following doesn't change from top to bottom in a group of a periodic table?
(a) Metallic nature (b) Atomic size
(c) Electro negativity (d) Valence electron

28. The element with the highest electron affinity in the periodic table is
(a) iodine (b) chlorine
(c) fluorine (d) oxygen

29. An element has atomic number 16 it will belongs to which period of the periodic table?
(a) 2 (b) 3
(c) 4 (d) 5

30. Which one of the following element is most electronegative?
(a) Cl (b) Na
(c) Al (d) P

31. Element A has electronic configuration 2, 7, B has configuration 2, 8, 6, C has configuration 2, 8, 8 while D has 2, 8, 7. Which element will show similar chemical properties?
(a) A and C (b) A and D
(c) B and C (d) B and D

32. The elements belonging to which group are called representative elements?
(a) Group 1, 2 and 13 to 17
(b) Group 3 to 12
(c) Group 13 to 18
(d) Element lying at the bottom of periodic table

33. Father of periodic table is called
(a) Dobereiner (b) Mendeleev
(c) Lother Meyer (d) Lewis

34. Atomic size increases in a group due to
(a) addition of more electrons
(b) decrease in number of protons
(c) addition of an extra shell
(d) all the above

35. The pair of atomic numbers which belongs to the same group
(a) 9, 14 (b) 17, 51
(c) 6, 53 (d) 12, 56

36. Among the following metals, which one has the weakest metallic character?
(a) Li (b) Na
(c) K (d) Cs

37. Anomalous pair among the following is
(a) boron - silicon (b) aluminum - nickel
(c) beryllium-indium (d) cobalt - nickel

38. Which one of the following element is a representative element?
(a) Fe (b) Mn
(c) Ge (d) Cu

39. The long form of the periodic table is based on
(a) number of electrons (b) mass of the atoms
(c) electro negativity (d) shape of the atom

40. As we move from left to right in a period electronegativity value
(a) decreases
(b) increases
(c) remains same
(d) does not following regular trend.

41. The electronic configuration of an element is 2, 8, 8, 2, this element is
(a) an alkali metal
(b) an alkaline earth metal
(c) a halogen
(d) a noble gas

42. In the given elements, which element does not have 2 valence electrons?
(a) Ba (b) Zn
(c) Na (d) Ca

43. The general name of the elements of 17th group is
(a) hydrides (b) halogens
(c) chalcogens (d) noble gases

44. The correct order of metallic character among the following is
(a) $Na > Mg > Al > Si$
(b) $Na > Al > Si > Mg$
(c) $Al > Si > Na > Mg$
(d) $Si > Mg > Na > Al$

45. Which one of the following is not a transition metal?
(a) Silver (b) Lead
(c) Tungsten (d) Manganese

46. Which of the following is incorrect series?
(a) Sc (21) to Zn (30)
(b) Rb (37) to Cd (48)
(c) La (57), Hf (72) to Hg (80)
(d) All of these

47. The distance between two bonded nuclei of chlorine is $1.98\overset{o}{A}$. Covalent radius of chlorine is
(a) $0.99\overset{o}{A}$ (b) $1\overset{o}{A}$
(c) $2\overset{o}{A}$ (d) $1.98\overset{o}{A}$

48. Transuranic elements are
(a) elements found in nature
(b) elements produced synthetically
(c) unreactive metals
(d) all the above

49. Which among the following element can form amphoteric oxide?
(a) Mg (b) C
(c) N (d) Al

50. Which of the following sets belongs to the same period?
(a) Li , Na , K (b) Li, Mg, Ca
(c) F, CI, Br (d) Ga, Ge, As

51. The horizontal rows of periodic table are called
(a) rows (b) periods
(c) lines (d) groups

52. Where will you find poor metals in the periodic table?
(a) Right side (b) Left side
(c) In the middle side (d) At bottom

53. The elements in a period of the periodic table becomes
(a) more non-metallic moving from top to bottom
(b) less metallic from left to right
(c) less metallic from top to bottom
(d) none of these

54. The first element of rare earth metals is
(a) cerium (b) actinium
(c) uranium (d) lanthanum

55. The total number of inner transition elements are
(a) 10 (b) 18
(c) 28 (d) 50

56. Which period of the periodic table contains maximum number of elements?
(a) 3^{rd} (b) 6^{th}
(c) 4^{th} (d) 5^{th}

57. Which of the following pair of atomic numbers represents s-block elements
(a) 7, 15 (b) 3, 20
(c) 9, 17 (d) 6, 12

58. Number of elements present in 5th period is
(a) 18 (b) 8
(c) 32 (d) 24

59. In the long form of the periodic table, the transition metals are placed in
(a) s -block (b) f -block
(c) d -block (d) s - and p -block

60. The valency of noble gas, in general, is
(a) 0 (b) 1
(c) 3 (d) 2

FILL IN THE BLANKS

1. Father of periodic table is .....

2. In Dobereiner classification of elements, the atomic mass of the middle element is nearly equal to the mean of the ..... and ..... element in each triad.

3. The element named as eka-aluminium by mendeleev was later named as.....

4. The size of an atom is also called.....

5. Elements in the same period have different

6. 18 vertical columns are called.....

7. The elements of group 1 are called.....

8. Isotopes belongs to the same ..... in the periodic table.

9. The number of elements present in the 4^{th} period of periodic table is.....

10. On moving from left to right in a period, the metallic character of elements ..... but the non-metallic character.....

11. . ..... period is incomplete.

12. Diagonal relationship of elements is due to same

13. The ionization energy of is

14. Law of octaves proposed, by..... .

15. A gradual change in the properties of elements in a group is also known as ..... in the periodic table.

16. Metals and non-metals are separated by few elements which are called.....

17. The basic nature of oxides of the elements in a period ..... in going from left to right.

18. All zero group elements are .....

19. The elements on the right side of the periodic table are called.....

20. The original long form of periodic table was designed by.....

TRUE OR FALSE

1. K, Ca, Sc and Ge belongs to the same period.

2. The decreasing order of electron affinity of F, Cl , Br is $Cl > F > Br$.

3. The horizontal rows of elements in a periodic table are called groups.

4. 3^{rd} period contains 8 elements. It is also called short period.

5. The vertical columns in a periodic table are called groups.

6. Elements in the same period have same valencies.

7. The acidic nature of oxide decreases along a period from left to right.

8. Sodium is the most electropositive element.

9. Electronegativity of elements increases in a period from left to right.

10. Francium is the most reactive metal and fluorine is the most reactive non-metal.

11. Francium has the smallest atomic radius and hydrogen has the largest atomic radius.

12. Elements of group 15 are called pnictogens.

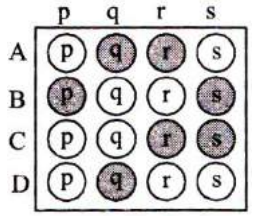
13. Lithium has higher ionization energy than sodium.

14. Elements of group 16 are called coinage metals.

15. The reactivity of non-metals decreases with increase in electronegative character.

MATRIX MATCH TYPE

In this section each question contains statements given in two columns which have to be matched statement (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in Column-II. The answers to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches are A-q, A-r, B-p, B-s, C-r, C-s and D-q, then the correctly bubbled matrix will look like as shown.



1.

Column I	Column II
(A) Group 3 to 12	(p) Noble gases
(B) Group 18	(q) Halogens
(C) Group 17	(r) Alkali metals
(D) Group 1	(s) Transition Elements

2.

Column I	Column II
(A) Law of octaves	(p) Moseley
(B) Triads of elements	(q) Dobereiner
(C) Periodic table	(r) Mendeleev
(D) Modem periodic law	(s) Newlands

3.

Column I	Column II
(A) Group 11	(p) Pnictogens
(B) Group 15	(q) Halogens
(C) Group 16	(r) Coinage metals
(D) Group 17	(s) Chalcogens

4.

Column I (Group)	Column II (No. of Valence electrons)
(A) Group 17	(p) 7
(B) Group 13	(q) 2
(C) Group 2	(r) 3
(D) Group 1	(s) 1

5.

Column I	Column II
(A) Valence electron in a period	(p) Decreases
(B) Atomic size in a period	(q) Increases
(C) Valence electron in a group	(r) Decreases (electro-positive) and increases (electronegative)
(D) Metallic character in a period	(s) Remain same

6.

Column I	Column II
(A) Horizontal rows	(p) Lithium
(B) Vertical columns	(q) Sodium
(C) Lightest metal	(r) Periods
(D) Most electropositive	(s) Groups

7.

Column I	Column II
(A) Metalloid	(p) Ge
(B) Noble gas	(q) Rn
(C) Halogen	(r) Rh
(D) Transition metal	(s) At

ASSERTION & REASON QUESTIONS

Directions: In each of the following questions, a statement of assertion is given and a corresponding statement of reason is given just below it. Of the four statements, given below, mark one as the correct answer

(a) if both Assertion and Reason are true and Reason is the correct explanation of Assertion

(b) if both Assertion and Reason are true but Reason is not the correct explanation of Assertion
(c) if Assertion is true but Reason is false
(d) if Assertion is false but Reason is true.

1. **Assertion:** The first ionization energy of Be is greater than that of B.
   Reason: 2p-orbital is lower in energy than 2s.
2. **Assertion:** According to Mendeleev's periodic law, the properties of elements are periodic function of their atomic numbers.
   Reason: Mendeleev's periodic law could not explain the phenomena of anomalous pairs.
3. **Assertion:** The original long form periodic table was designed by Bohr in 1920.
   Reason: The vertical columns of elements in the periodic table are called periods.
4. **Assertion:** The increasing order of non-metallic character is $Si < B < C$.
   Reason: Non-metallic character increases along a period and decreases down the group.
5. **Assertion:** The first ionization enthalpy of aluminum is lower than that of magnesium.
   Reason: Ionic radius of aluminum is smaller than that of magnesium.
6. **Assertion:** Noble gases are almost inert.
   Reason: They have completely filled outermost shell.
7. **Assertion:** Newland's law of octaves of elements is a function of their state that the property of every eighth element is the repetition of the first.
   Reason: The maximum of 8 electrons can be accommodated in valence shell.
8. **Assertion:** F is more electronegative than Cl
   Reason: F has high electron affinity than Cl.
9. **Assertion:** According to Mendeleev, periodic properties of elements are function of their atomic masses.
   Reason: Atomic number is equal to the number of protons.
10. **Assertion:** Second period consists of 8 elements.
    Reason: Number of elements in each period is four times the number of atomic orbitals available in the energy level that is being filled.
11. **Assertion:** Element in the same vertical column have similar properties.
    Reason: Elements have periodic dependence upon the atomic number.
12. **Assertion:** lionization potential across the period is Na < Al < Mg < Si.
    Reason: lionization potential decreases with decrease in atomic size.
13. **Assertion:** Transition elements exhibit variable valency.
    Reason: Transition elements possess unpaired electrons.
14. **Assertion**: $NaCl$ is ionic compound.
    Reason: Electro negativity difference between Na and Cl is greater than 1.9.
15. **Assertion:** P has higher I.E. than sulphur.
    Reason: I.E. increases from left to right in a period.