

CBSE Test Paper 02

Chapter 05 Periodic Classification of Elements

1. Which of the following statement is true?

Statement A: Electron affinity of fluorine is more than that of chlorine.

Statement B: Carbon monoxide is an acidic oxide. **(1)**

- a. Both the Statement A and B are true
- b. Neither statement A nor statement B is true
- c. Statement A is true, B is false
- d. Statement B is true, A is false

2. Which of the following statements is not correct about the trends when going from left to right across the periods of the Periodic Table? **(1)**

- a. The number of valance electrons increases
- b. The atoms lose their electrons more easily
- c. The oxides becomes more acidic
- d. The elements become less metallic in nature

3. The law of octaves was proposed by **(1)**

- a. Mendeleev
- b. Newland
- c. Dobereiner
- d. Lothar Meyer

4. What is the nature of an element having atomic number 20? **(1)**

- a. metallic
- b. metalloid
- c. anomalous nature
- d. non metallic

5. Nitrogen and phosphorus belong to the group 15 of the periodic table. Which of these will be more electronegative? **(1)**

- a. Nitrogen
- b. Both are equally electronegative
- c. None of them are electronegative
- d. Phosphorus

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6. What are actinides? **(1)**
 7. Name two elements you would expect to show chemical reactions similar to magnesium. What is the basis for your choice? **(1)**
 8. Mention the type of compounds formed between group 1 and group 17 elements. **(1)**
 9. Where would you locate the element with electronic configuration 2, 8 in the modern periodic table? **(1)**
 10. The three elements A, B and C with similar properties have atomic masses X, Y and Z respectively. The mass of Y is approximately equal to the average mass of X and Z. What is such an arrangement of elements called as? Give one example of such a set of elements. **(3)**
 11. Carbon (atomic number 6) and silicon (atomic number 14) are elements in the same group of the periodic table. Give the electronic arrangements of the carbon and silicon atoms and state the groups in which these elements occur. **(3)**
 12. Would you place the two isotopes of chlorine, Cl-35 and Cl-37 in differed slots because of their different atomic masses or in the same because their chemical properties are the same? Justify your answer. **(3)**
 13. Write down the electronic configuration of elements with atomic numbers 2, 14, 17, 19. Indicate the group of the periodic table to which they belong. **(3)**
 14. Give a brief discussion of the Mendeleev's classification of the elements. **(5)**
 15. Compare and contrast the arrangement of elements in Mendeleev's Periodic table and the Modern Periodic table. **(5)**

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Answers

1. b. Neither statement A nor statement B is true

Explanation: Statement A: Fluorine, though higher than chlorine in the periodic table, has a very small atomic size. This makes the fluoride anion so formed unstable (highly reactive). As a result, fluorine has an electron affinity less than that of chlorine.

Statement B: Carbon monoxide is a neutral oxide

2. b. The atoms lose their electrons more easily

Explanation: On moving from left to right in a period, the electropositive character of element decreases, i.e. the tendency of metals to lose electrons decreases.

3. b. Newland

Explanation: Newland

The law states that when the elements are arranged in the order of their increasing atomic masses, the properties of the eighth element are a repetition of the properties of the first element.

4. a. metallic

Explanation: The element with atomic number 20 is Calcium (Ca) and it has metallic character as it loses its two valence electrons easily to complete its octet.

5. a. Nitrogen

Explanation: On going down in a group of the periodic table, the electronegative character of elements decreases. So, Nitrogen at being the top of group 15 of the periodic table is most electronegative.

6. The elements from atomic number 89 to 103 are called actinides. All of them belong to group III B and are placed outside the periodic table.

7. Calcium and Strontium would show chemical reactions similar to magnesium. They have the same number of electrons in the outermost shell. It is the electrons that take

part in a chemical reaction.

8. Ionic compounds, as 1 group is electropositive called alkali metals and 17 group is electronegative called halogens
9. The element with an electronic configuration of (2,8) have completely filled valence shell. It has two shells. Therefore, it belongs to second period and group 18 (noble or inert gas) in the modern periodic table. Group number = valence shell electron + 10 = 8 + 10 = 18.
10. Since., The given three elements A, B and C with similar properties have atomic masses X, Y and Z respectively and mass of Y is approximately equal to the average mass of X and Z. Therefore, this arrangement of elements in which the atomic mass of middle element is almost the mean of atomic masses of first and third elements is known as Dobereiner's triads.

e.g. Ca (Atomic mass=40), Sr (Atomic mass=88) and Ba (Atomic mass=137)

$$\text{Atomic mass of Sr} = \frac{40+137}{2} = 88.5$$

Other example is Li(7), Na (23) and K (39).

11. The required information may be given in a tabular form as follows:

Element	Atomic No.	Electronic arrangement	Group
Carbon (C)	6	2, 4	14
Silicon (Si)	14	2, 8, 4	14

12. In Mendeleev's Periodic Table the two isotopes of chlorine, Cl-35 and Cl-37 would be placed in different slots because they have different atomic mass . But because of their similar chemical properties which is a more reliable property as it is based on the number of valence electrons, they would be placed in the same slot.
13. The information is being given in a tabular form.

Atomic number	Electronic configuration K L M N	Group
2	2	18
14	2, 8, 4	14

17	2, 8, 7	17
19	2, 8, 8, 1	1

14. Mendeleev's classification of the elements is based upon the Mendeleev's periodic law. The law helped him to develop a table called Mendeleev's Periodic Table. The table has been divided into vertical columns which are called Groups and horizontal rows which are known as Periods. These are briefly discussed as follows:

i. Groups: These are the vertical rows. There are in all eight groups. The elements present in first seven groups are called Normal Elements. The elements present in group VIII are called the Transition Elements. Each group (I to VII) has been further divided into sub-groups which are called A and B. The inert gas or noble gas elements (He, Ne, Ar, Kr, Xe) were not known at that time. Therefore, they were not shown in the table. All the elements placed in a group have the same valency. All the elements present in a sub-group have similar properties. For example, group I-B includes element Cu (Copper), Ag (Silver) and Au (Gold). They have similar properties.

ii. Periods: These are the horizontal rows called periods. There were in all six periods in the original periodic table. The seventh period was added later on and this is not shown in the periodic table. The properties of the elements present in a period change systematically. For example, in every period, the first element is a typical metal. As we move from left to right, the metallic character gradually decreases and non-metallic character increases. For example, in period 2, the first element Li (Lithium) is metal while the last element F (Fluorine) is a non-metal. The Mendeleev's Periodic Table is shown below:

Mendeleev's Periodic Table

GROUPS PERIODS	Groups (I to VII are Normal groups & group VIII is of Transition metals)														
	I		II		III		IV		V		VI		VII		VIII
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
1	H														
2	Li		Be		B		C		N		O		F		
3	Na		Mg		Al		Si		P		S		Cl		
4	K		Ca		Sc		Ti		V		Cr		Mn		Fe Co Ni
	Cu		Zn		Ga		Ge		As		Se		Br		
5	Rb		Sr		Y		Zr		Nb		Mo		Tc		Ru Rh Pd
	Ag		Cd		In		Sn		Sb		Te		I		
6	Cs		Ba		La		Hf		Ta		W		Re		Os Ir Pt
	Au		Hg		Tl		Pb		Bi		Po		At		

15. Similarities.

- 1) In both the elements are arranged in groups and periods.
- 2) In both similar elements are placed in same group.
- 3) Both the classification make the study of elements simple and systematic.

Differences.

Mendeleev's Periodic Table	Modern Periodic Table
1) The elements are arranged in order of increasing mass numbers.	1) The elements are arranged in order of increasing atomic numbers.
2) It has 8 vertical columns called groups.	2) It contains eighteen vertical columns called groups.
3) Groups have been divided into sub groups.	3) Each group is an independent group.
4) Inert gases are not included in this table.	4) Inert gases are included in this periodic table.
5) In Mendeleev's periodic table transition elements included with other elements.	5) In Modern periodic table transition elements placed in separate block.
6) Mendaleev's periodic table contains about 66 elements.	6) Modern periodic table contains about 112elements .