CREST Olympiads

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CREST Science Olympiad (CSO) Worksheet for Class 10

Topic

Periodic Classification of Elements

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Worksheet on Periodic Classification of Elements

1. **Which of the following elements belong to the I. same group and II. same period?**

Element	Atomic Number
P	19
Q	21
R	24
S	37

a. I: P, S; II: Q, R
b. I: P, Q, R; II: R, S
c. I: Q, S; II: P, R
d. I: P, S; II: P, Q, and R

2. **Arrange the following elements in order of increasing electronegativity:**

a. Cl < S < P < Al
b. S < P < Cl < Al
c. P < S < Al < Cl
d. Al < P < S < Cl

3. **Which of the following statements is correct regarding the trends when going down a group in the modern periodic table?**

I. The atomic number decreases.
II. The number of valence shells remains the same.
III. The atomic radius generally increases.
IV. Metallic character increases.

a. I, IV
b. III, IV
c. II, III, IV
d. Only III

4. **You are given two elements, X and Y, from the same period of the periodic table. Element X is on the left side of the period, and element Y is on the right side. Which element is more likely to form a cation?**

a. Element X
b. Element Y
c. Both X and Y
d. Neither X nor Y

5. **In a laboratory experiment, you observe that when element X reacts with water, it produces an alkaline solution and hydrogen gas is released. Which group in the periodic table is element X most likely to belong to?**

   a. Alkali metals
   b. Halogens
   c. Noble gases
   d. Alkaline earth metals

Answer Key

1. d - The elements P and S belong to the same group because they have the same number of valence electrons, which is 1. They are both in Group 1, known as the alkali metals. The elements P, Q, and R belong to the same period because they have the same number of electron shells (energy levels) in their atomic structure. In this case, they are all in the fourth period of the periodic table. Element S is in a different period as it has more electron shells.

2. d - Cl (Chlorine) is the most electronegative element among the options, as it is a halogen and belongs to Group 17 (Group VIIA) of the periodic table. Halogens are known for their high electronegativity.

   S (Sulphur) is next in electronegativity as it is a non-metal and is to the right of P (Phosphorus) and Al (Aluminum) in the periodic table.
   P (Phosphorus) is a non-metal but has a slightly lower electronegativity compared to sulphur.
   Al (Aluminum) is a metal and has the lowest electronegativity among these elements.

3. b - The atomic radius generally increases when going down a group. This is because each new element in the group has an additional energy level (valence shell), leading to a larger atomic size. Metallic character increases when going down a group. Hence, these statements are correct.
   The atomic number does not decrease when going down a group; it increases. Each new element in a group has a higher atomic number than the one above it. Also, the number of valence shells increases when going down a group. Each new element in the group has an additional energy level (valence shell), so the number of valence shells increases. So, these statements are incorrect.

4. a - Element X, which is on the left side of the period in the periodic table, is more likely to form a cation. Elements on the left side of the periodic table, especially metals, tend to lose electrons to achieve a stable electron configuration. When they lose electrons, they form positively charged ions called cations. This behaviour is characteristic of elements in Groups 1 and 2 and some transition metals.

   Element Y, being on the right side of the period, is more likely to form anions (negatively charged ions) by gaining electrons to achieve a stable electron configuration. This is typical of nonmetals on the right side of the periodic table.

5. a - Element X is most likely to belong to the alkali metals group in the periodic table. Alkali metals are known for their strong reactivity with water, producing alkaline solutions and releasing hydrogen gas when they react with it. This behaviour is a characteristic feature of alkali metals like lithium (Li), sodium (Na), potassium (K), and others in Group 1 of the periodic table.

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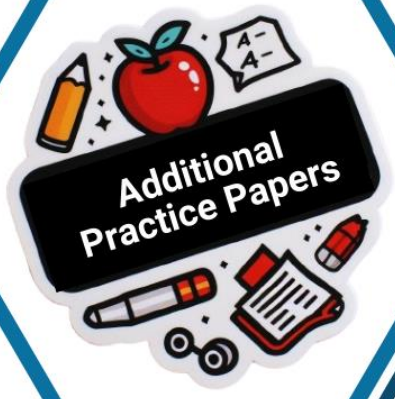

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