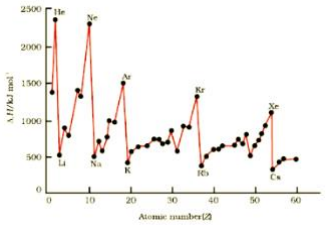
DELHI PUBLIC SCHOOL JAMMU
CLASS - XI
SESSION - 2024 - 2025
Assignment
Month: May

CLASS 11 - CHEMISTRY

<table>
<tr><td></td><td>Section A</td><td></td></tr>
<tr><td>1</td><td>The electrons are ejected from the metal surface when thelight of certain frequenciesstrikes the surface is called _____.
a) Faraday’s cathode ray discharge model
b) Thomson model for electron
c) Photoelectric effect
d) Planck’s quantum theory</td><td>[1]</td></tr>
<tr><td>2</td><td>The tendency of an atom to attract the shared pair of electrons to itself in a bond is called as _____.
a) Ionization enthalpy
b) Electronegativity
c) Electron gain enthalpy
d) Electropositivity</td><td>[1]</td></tr>
<tr><td>3</td><td>Assertion (A): Threshold frequency is a characteristic for a metal.
Reason (R): Threshold frequency is the maximum frequency required for the ejection of electrons from the metal surface.
a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.</td><td>[1]</td></tr>
<tr><td>4</td><td>Assertion: First ionization energy for nitrogen is lower than that of oxygen.
Reason: Across a period effective nuclear charge decreases.
a) If both Assertion & Reason are true and the reason is the correct explanation of the assertion.
b) If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.
c) If Assertion is true statement but Reason is false.
d) If both Assertion and Reason are false statements.</td><td>[1]</td></tr>
<tr><td></td><td>Section B</td><td></td></tr>
<tr><td>5</td><td>Match species given in Column I with the electronic configuration given in Column II.
<table>
<tr><th>Column I</th><th>Column II</th></tr>
<tr><td>(i) Cr</td><td>(a) [Ar]3d ^{8} 4s ^{0}</td></tr>
<tr><td>(ii) Fe $^{2+}$</td><td>(b) [Ar]3d ^{10} 4s ^{1}</td></tr>
<tr><td>(iii) Ni $^{2+}$</td><td>(c) [Ar]3d ^{6} 4s ^{0}</td></tr>
<tr><td>(iv) Cu</td><td>(d) [Ar] 3d ^{5} 4s ^{1}</td></tr>
<tr><td></td><td>(e) [Ar]3d ^{6} 4s ^{2}</td></tr>
</table></td><td>[2]</td></tr>
</table>

6	Match the correct atomic radius with the element: <table><tr><th>Element</th><th>Atomic radius (pm)</th></tr><tr><td>(a) Be</td><td>(i) 74</td></tr><tr><td>(b) C</td><td>(ii) 88</td></tr><tr><td>(c) O</td><td>(iii) 111</td></tr><tr><td>(d) B</td><td>(iv) 77</td></tr><tr><td>(e) N</td><td>(v) 66</td></tr></table>	**[2]**
7	The radius of first Bohr orbit of hydrogen atom is $0.529\overset{o}{A}$. Calculate the radii of (i) the third orbit of He^{+} ion and (ii) the second orbit of Li^{2+} ion.	**[2]**
8	List the factors that can influence the ionic radius of an element.	**[2]**
	Section C	
9	If the photon of the wavelength 150 pm strikes an atom, and one of its inner bound electrons is ejected out with a velocity of 1.5×10^{7} ms $^{-1}$. Calculate the energy with which is a bound to the nucleus.	**[3]**
10	The amount of energy released when1×10^{10} atoms of chlorine in vapor state are converted to Cl^{-} ionsaccording to the equation, $$Cl(g) + e^{-} \rightarrow Cl^{-}(g) is 57.86 \times 10^{-10} J$$ Calculate the electron gain enthalpy of the chlorineatom in terms of kJ mol $^{-1}$ and eV per atom.	**[3]**
	Section D	
11	**Read the text carefully and answer the questions:** The orbital wave function orψ for an electron in an atom has no physical meaning.1s orbital the probability density is maximum at the nucleus and it decreases sharply as we move away from it.After reaching a small maxima it decreases again and approaches zero as the value of r increases further.These probability density variation can be visualised in terms of charge cloud diagrams.Boundary surface diagrams of constant probability density for different orbitals give a fairly good representation of the shapes of the orbitals. Aboundary surface or contour surface is drawn in space for an orbital on which the value of probability density $\|\psi\|^2$ is constant.The size of the s orbital increases with increase in n, that is, 4s > 3s > 2s > 1s and the electron is located further away from the nucleus as the principal quantum number increases. 1. Why is the energy of 1s electron lower than 2s electron? 2. Why don't we draw a boundary surface diagram within the probability of finding the electron is 100%? 3. Calculate the total number of angular nodes and radial nodes present in the 3p orbital. 4. Describe the shape of s orbitals?	**[4]**
12	**Read the text carefully and answer the questions:** A quantitative measure of the tendency of an element to lose electrons is given by its Ionization Enthalpy. It represents the energy required to remove an electron from an isolated gaseous atom (X) in its ground state. The ionization enthalpy is expressed in units of kJ mol^{-1} . We can define the second ionization enthalpy as	**[4]**

	the energy required to remove the second most loosely bound electron. Energy is always required to remove electrons from an atom and hence ionization enthalpies are always positive. The second ionization enthalpy will be higher than the first ionization enthalpy.  Variation of first ionization enthalpies (Δ_i H) with atomic number for elements with Z = 1 to 60. On the other hand, minima occur at the alkali metals and their low ionization enthalpies can be correlated with their high reactivity. In addition, you will notice two trends the first ionization enthalpy generally increases as we go across a period and decreases as we descend in a group. The ionization enthalpy and atomic radius are closely related properties. 1. Why second ionization enthalpy will be higher than the first ionization enthalpy? 2. Why E_1 of O is lower than that of N but I.E $_2$ O is higher than that of N? 3. The first ionization enthalpy (Δ_i , H) values of the third period elements, Na, Mg and Si are 496, 737 and 786 kJ mol $^{-1}$ respectively. Predict whether the first Δ_i H value for Al will be more close to 575 or 760 kJmol $^{-1}$? 4. The first (Δ_i H) and the second (Δ_i H) ionization enthalpies (in kJ mol $^{-1}$) and the (Δ_{eg} H) electron gain enthalpy (in kJ mol $^{-1}$) of a few elements are given below: **Elements** | ^{i} **H1** | ^{i} **H2** | ^{eg} **H** I | 520 | 7300 | -60 II | 419 | 3051 | -48 III | 1681 | 3374 | -328 IV | 1008 | 1846 | -295 V | 2372 | 5251 | +48 VI | 738 | 1451 | -40 Which of the above elements is likely to be the least reactive element?	
	Section E	
13	1. The diameter of zinc atom is2.6$\mathring{A}$. Calculate a. the radius of zinc atom in pm b. number of atoms present in a length of 1.6 cm if the zinc atoms are arranged side by side lengthwise. 2. 2×10^{8} atoms of carbon are arranged side by side. Calculate the radius of carbon atom if length of this arrangement is 2.4 cm.	**[5]**
14	Write down the outermost electronic configuration of alkali metals. How will you justify their placement in group 1 of the periodic table?	**[5]**