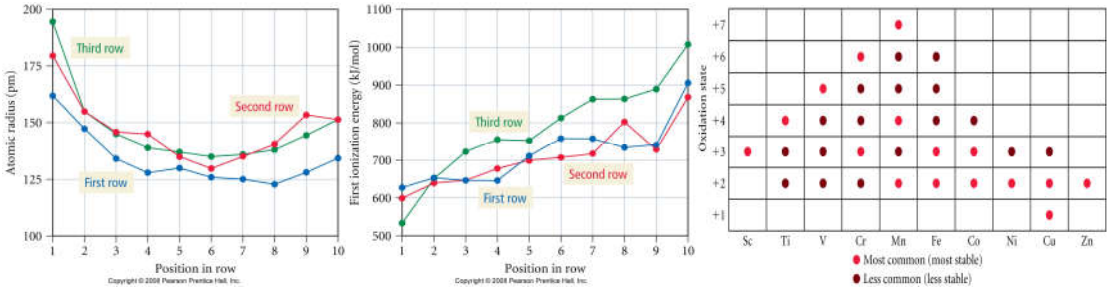
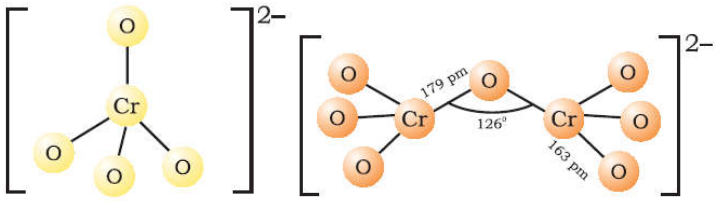
Date: **lesson/Topic: d & f block elements**

Class: XII **Period Required:** **Subject: Chemistry**

Gist of Lesson	Concepts/activities(individual or group)/demo/e-class
• To learn the positions of the *d*– and *f*-block elements in the periodic table; • To know the electronic configurations of the transition (*d*-block) and the inner transition (*f*-block) elements; • To appreciate the relative stability of various oxidation states in terms of electrode potential values; • To describe the preparation, properties, structures and uses of some important compounds such as $K_2Cr_2O_7$ and $KMnO_4$; • To understand the general characteristics of the *d*– and *f*–block elements and the general horizontal and group trends in them; • To describe the properties of the *f*-block elements and give a comparative account of the lanthanoids and actinoids with respect to their electronic configurations, oxidation states and chemical behaviour.	**THE TRANSITION ELEMENTS (d-BLOCK)** Position in the Periodic Table, Electronic Configurations of the d-Block Elements $(n-1)d^{1-10}\ ns^{1-2}$, General Properties of the Transition Elements, Variation in Atomic and Ionic Sizes, The atomic radii decreases from group 3 to 6 (i.e. Sc to Cr) because of increase in effective nuclear charge gradually. Ionisation Enthalpies,  Oxidation States, in lower oxidation state are BASIC, intermediate oxidation state are AMPHOTERIC, highest oxidation state are ACIDIC. The transition elements show variable oxidation state due to small energy difference between (n-1)d &ns orbital as a result both (n-1)d &ns electrons take part in bond formation. Trends in the M^{2+}/M Standard Electrode Potentials, Trends in the M^{3+}/M^{2+} Standard Electrode Potentials, Trends in Stability of Higher Oxidation States, Chemical Reactivity and E^{o} Values, lower value of Reduction Potential due to high ionization potential, high heat of sublimation & low enthalpy of hydration. Magnetic Properties, Most of transition elements are paramagnetic due to presence of unpaired electrons. Formation of Coloured Ions, Formation of Complex Compounds, due to presence of unpaired electrons in (n-1) d orbital & thus they can undergo d-d transition. Catalytic Properties, Formation of Interstitial Compounds, Alloy Formation, **Important Compounds of Transition Elements**, Oxides and Oxoanions of Metals, Potassium dichromate $K_2Cr_2O_7$, Potassium permanganate $KMnO_4$.   **THE INNER TRANSITION ELEMENTS (f-BLOCK)** **The Lanthanoids**: Electronic Configurations, $[Xe]4f^{1-14}5d^{0-1}6s^{2}$. Atomic and Ionic Sizes, Atomic and Ionic Sizes, General Characteristics. **The Actinoids**: Electronic Configurations, Ionic Sizes, General Characteristics and Comparison with Lanthanoids.

Remarks/Suggestions: _____ Sign of Teacher:_____

Date of commencement: **Expected date of completion:** **Actual date of completion:**

HOME ASSINGMENT	HOTS and MLL	Correlation with other subjects
Students may be asked to solve all the intext questions and some of the exercise questions. Pupils may be asked to prepare a flow chart of preparation of Potassium Permanganate form pyrolusite 1. Copper (I) is diamagnetic whereas copper (II) is paramagnetic. Explain the reason. 2. Sc^{3+} is colourless while Cr^{3+} is coloured. Why is it so? 3. Calculate the magnetic moment of Fe^{3+}. 4. Why Hg is not considered a transition metal. 5. Give reasons for the following (Any four):- (i) Fe has higher melting point than Cu. (ii) $[Ti(H_2O)_6]^{3+}$ is coloured while $[Sc(H_2O)_6]$ is colourless. (iii)The 4d and 5d series of transition metals have more frequent metal-metal bonding in their compound than do the 3d metals.	1. Silver atom has completely filled d orbitals in its ground state. How can you say that it is a transition element? 2. Transition elements exhibit their highest oxidation state in their oxides not in Fluorides. Why? 3. Explain why, Zn (II) salts are white while Mn (VII) are deep purple in colour? 4. KMnO4 is used in acidic medium quite frequently than in its aqueous or alkali for oxidizing purpose. Why? 5. Give reasons: i) Zr and Hf have identical sizes ii) In the titration of $FeSO_4$ with $KMnO_4$ in the acidic medium dil.H_2SO_4 is used instead of dil HCl 6. Calculate the spin only magnetic moment of Iron present in the following compound.$[Fe(H_20)_5NO]^{2+}$ 7. Among the ionic species Sc^{3+}, Ce^{4+} and Eu^{2+} Which one is a good oxidizing agent? 8. What is meant by disproportionation? Give two examples of disproportionation reactions in aqueous medium. 9. Why are Fe^{3+} and Cu^{2+} prominent in their aqueous solutions? 6. Name the oxometal anions of the first series of transition metals in which the metal exhibits the oxidation state equal to its group number. 7. What is lanthanide contraction? What are the consequences of lanthanide contraction?Why are Mn^{2+} compounds more stable than Fe^{2+} compounds towards oxidation to +3 state? 8. There is a dip in the melting point curve at Mn, though the preceding element also has similar electronic configuration. Why? 9. Give the preparation of Potassium Dichromate from iron chromate ore. What is the effect of increasing pH on a solution of potassium dichromate? Describe one of its Oxidizing properties. 10. Account for the following statements: (i)Transition metals some time exhibit very low oxidation state such as +1and 0. (ii)All the transition elements have high m.p. & .p. (iii)Transition elements form a number of interstitial compounds. 11. How will you prepare $KMnO_4$ from pyrolusite ore? Give equations of its oxidizing properties in acidic & basic medium	Related to organometallic and coordination chemistry. Related to subject biology as haemoglobin studied there has Fe atom which transport O_2 and CO_2. Related to mathematics as students are asked to draw the structures of chromate and dichromate ions. Colours produced by most of the transition elements compounds are related to optics in physics.

Sign of Principal:_____