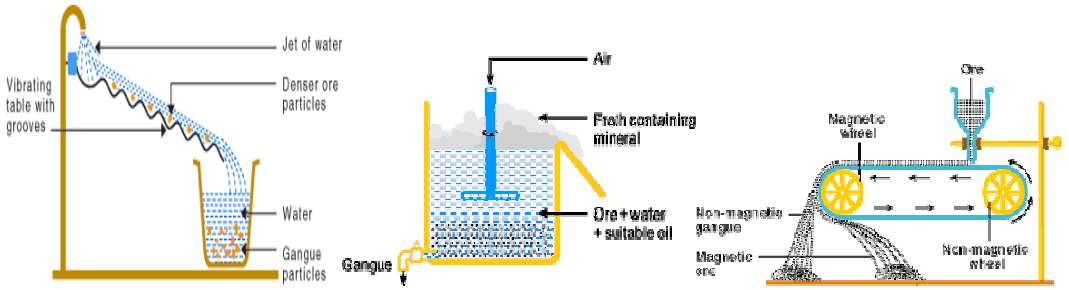
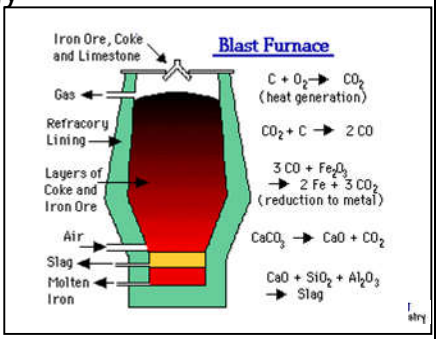
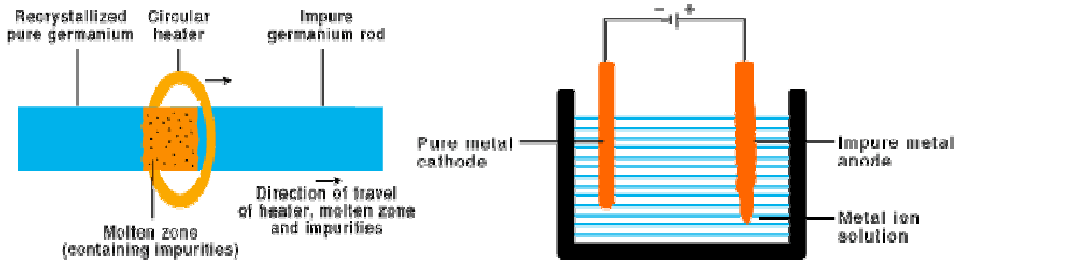
CHAPTER: PRINCIPLES AND PROCESS OF EXTRACTION- LESSON PLAN

Date: **Class:** **Period Required:**

Gist of Unit /Sub Unit	*Activities(Individual or Group)/Demo/ E-class/PPT*
➔explain the terms minerals, ores, concentration, benefaction, calcination, roasting, refining, etc.; ➔understand the principles of oxidation and reduction as applied to the extraction procedures; ➔ apply the thermodynamic concepts like that of Gibbs energy and entropy to the Principles of extraction of Al, Cu, Zn and Fe; ➔ explain why reduction of certain oxides like Cu_2O is much easier than that of Fe_2O_3; ➔explain why CO is a favourable reducing agent at certain temperatures while coke is better in some other cases; ➔ explain why specific reducing agents are used for the reduction Purposes.	*Thermodynamics illustrates why only a certain reducing element and a minimum specific temperature are suitable for reduction of a metal oxide to the metal in an extraction.* • Occurrence of Metals : Metallurgy, Minerals , Ores and Gangue • **Concentration of Ores:** **➔Hydraulic Washing ➔ Magnetic Separation ➔Froth Floatation Method➔ Leaching**  • Extraction of Crude Metal from Concentrated Ore (a) Conversion to oxide,: Calcination and Roasting **(b)** Reduction of the oxide to metal • Thermodynamic Principles of Metallurgy ***➔Extraction of iron from its oxides*** ***➔Extraction of copper from cuprous oxide [copper(I) oxide]*** ***➔Extraction of zinc from zinc oxide*** • Ellingham Diagrams  • Electrochemical Principles of Metallurgy **➔Aluminium** **➔Oxidation and Reduction methods** • Refining (a) Distillation (b) Liquation (c) Electrolysis (d) Zone refining (e) Vapour phase refining (f) Chromatographic methods 

Remarks/ Suggestion *Teacher Signature*

Date of Commencement : **Expected Date of Completion:**

HOME ASSINGMENT	*HOTS AND MLL*	*CO-RELATION WITH OTHER SUBJECTS And extended learning*
➔ Students are given the Home assingment to solve all the in text question solved and unsolved exercises of NCERT. ➔ Exemplar problems for students preparing for competitive examinations. ➔ Compile all questions asked from the chapter in last five years in CBSE board examination.	**➔ VSA question of one mark** 1. What is the purpose of drawing Ellingham diagram? 2. Which is better reducing agent at 983K, Carbon or CO? 3. Give the leaching reaction involved in the extraction of Gold. 4. What is the role of graphite rods in electrometallurgy of aluminum? **➔SA question of two marks (Any six)** 5. Explain the leaching of bauxite ore. 6. What are depressants? 7. Why copper matte is put in silica lined converter? 8. Copper can be extracted by hydrometallurgy but not Zn. Why? 9. Why is reduction of metal oxide easier if the metal formed is in liquid state at the temperature of reduction. 10. What is Monds process of refining of metals? 11. The value of $\Delta_f G^0$ for Cr_2O_3 is -540kJ/mole & that of Al_2O_3 is -827kJ/mole. Is the reduction of Cr_2O_3 possible with aluminium? 12. What are the functions of collectors and stabilizers in the froth floatation method? 13. Why is reduction of metal oxide easier if metal formed is in liquid state at temperature of reduction? **➔ SA question of three marks** 14. What are the different reactions that take place at different temperatures in the extraction of iron ore in the blast furnace? 15. Name the principal ore of aluminium and describe how Al is extracted from its ore. 16. Explain the following:- (i) Zinc but not copper is used for recovery of Ag from the complex $[Ag(CN)_2]$-. (ii) Partial roasting of sulphide ore is done in the metallurgy of copper. (iii) Extraction of Cu from pyrites is difficult than that from its oxide ore through reduction	➔ PPT available ➔Lectures on Youtube. ➔**Different types of furnaces** Furnace is a device used for heating during metallurgical processes. **(a) Blast furnace** is widely used for smelting iron, copper and lead ores. It is composed of tall structure made of steel with arrangements for blowing air near base, slag hole, a tapping hole and an exit to remove waste. **(b) Reverberatory furnace** is another type of furnace used for calcination, roasting or for smelting. **(c) Muffle furnace** is a furnace in which charge container is heated from all sides. **(d) Bessemer furnace** is a pear-shaped furnace made of steel plates lined inside with lime or magnesium.

Principal Signature