

Materials and Heat Balance in Metallurgical Processes - Web course

COURSE OUTLINE

Basics of materials and heat balance: measurement of quantities, stoichiometry, Thermochemistry and thermophysics; errors in measurements

Mineral beneficiation: basics and materials balance exercises; Calcination: concept and exercise

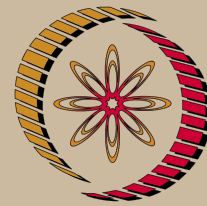
Material and heat balance in metal extraction processes like roasting, matte smelting, reduction smelting, converting, refining with ample exercises and illustrations; RIST diagram basics and illustration

Additional topics such as energy balance in melting in cupola, gasification and industrial furnaces

Thoughts in energy balance in relation to conservation of natural resources.

COURSE DETAIL

| Module.No | Module Name | Topics |
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| 1 | Basics of energy balance | <ol style="list-style-type: none"> 1. Introduction 2. Measurement of quantities 3. Exercises on measurement of quantities 4. Stoichiometry, concept 5. Exercises on stoichiometry 6. Thermochemistry: Basics 7. Exercises on thermochemistry calculations 8. Errors in measurements 9. Fundamentals of energy balance 10. Introduction to Mineral beneficiation |
| 2 | Mineral processing, calcination and roasting | <ol style="list-style-type: none"> 11. Materials balance in mineral processing 12. Exercises in mineral processing 13. Calcination 14. Sources of energy for pyrometallurgical extraction 15. Calculations on air requirements in metal extraction 16. Roasting: Basics and predominance area diagram 17. Material balance in roasting of sulphides ores-I 18. Material balance in roasting- of sulphide ore-II 19. Material balance in roasting- of sulphide ore-III |



NP-TEL

NPTEL

<http://nptel.iitm.ac.in>

Metallurgy and Material Science

Pre-requisites:

Thermodynamics course

Additional Reading:

1. R.Schuhman n Jr. Metallurgical engineering, vol.1: Engineering principles.
2. O.P.Gupta: Elements of fuels, furaces and refractory.

Coordinators:

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Department of Materials and Metallurgical Engineering IIT Kanpur

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| | | 20. Heat balance in roasting |
| 3 | Smelting | <ul style="list-style-type: none"> 21. Smelting: Basics 22. Material balance in matte smelting-I 23. Material balance in matte smelting-II 24. Reduction smelting-basics 25. Material balance in lead smelting 26. Material balance in Imperial smelting 27. Basics of ironmaking 28. Materials balance in cokemaking 29. Ironmaking in blast furnace 30. Blast furnace material balance-I |
| 4 | Converting and other metallurgical processes | <ul style="list-style-type: none"> 31. Blast furnace material balance-II 32. RIST Diagram 33. Exercises on RIST diagram 34. Converting- basics 35. Materials balance in converting 36. Energy balance in cupola melting 37. Gasification 38. Materials and heat balance in a gasifier 39. Industrial furnaces 40. Energy audit in industrial furnaces 41. Energy balance and conservation of energy resources |

References:

Not available