teri school of advanced studies

Google Earth Education

LESSON TITLE MINERALS & ORES

TIME 50[minutes]

OVERVIEW [One sentence describing how teachers will use Google Earth to add engaging, real world connections to an inquiry based lesson.
The Google map tool will be used in this lesson, to highlight the magnificence of minerals and ores and their metallurgy.

SUBJECT/TOPIC **CHEMISTRY/ GENERAL PRINCIPLES & PROCESSES OF ISOLATION OF ELEMENTS**	**AGE LEVEL 16-17years [CLASS TWELVE]**
LEARNING OBJECTIVES: • Students will be able to appreciate the natural occurance of elements. • Students will be able to research on the thermodynamic principles of metallurgy. • Students will participate in collaborative discussions to be able to analyse the electrochemical principles of metallurgy. **.To introduce students to difference between "crushing" and " concentration" of the ore**. • Students will apply their learnings in the form of an educational project to understand the underlying principles of metallurgical processes.	1. **Inquiry** " How can we best use the bounty of minerals and find the solution for the energy crisis"
MAT ERIALS NEEDED: • Access to Google Earth. • Student copies of NCERT part 1 Chemistry, class 12 • Student internet access	**Lesson Summary** • Engage: To locate principles to provide a framework for scientists, engineers and chemistry students to use when working on metallurgy. • Explore: To gather information on The Principles that focus on the concentration and purification of ores. • Explain: To identify the various methods of reduction of oxides to yield the metal. • Revise: Through this lesson, students will also use weight and measurement to understand the concept of a recipe as it is applied to a chemical process and think critically about that process.

- Apply: Students will be asked to work in four groups in compiling the table below:

Metal/ ore	Occurrance	Process of reduction	Refining & alloys

Sustainable Development Goals [One or more Sustainable Development Goals addressed in this lesson.]

Culminating Task/Assessment

Students will be asked to use an efficient procedure and energy friendly procedure to make an alloy and record its properties and uses.

Textbook Chapter

Ch 6: GENERAL PRINCIPLES & PROCESSES OF ISOLATION OF ELEMENTS Class 12, NCERT.

Engage (5 minutes)

1. Students should have been introduced to the metal activity series.
2. Introduce the essential question that will guide the inquiry investigation ie " How can we best use the bounty of minerals and find the solution for the energy crisis"

Explore (25 minutes)

1. Teachers introduce the first source of information using an Earth story / Google maps, following the link: https://www.google.com/maps/d/edit?mid=16tQPo8U1UPUx4gNvBZ-DQ1pZh-Q2b3Fd&usp=sharing
2. Students record observations or evidence as it relates to the inquiry.
3. Students identify relationships or patterns and form a hypothesis based on information gained.

Explain (20 minutes)

1. Teachers organize students into small groups or partners.
2. Students share first "hypothesis" with small group of four and discuss the topic, concentration of ores and how it helps in environment conservation.
3. Teachers facilitate whole group discussion in which students share their hypotheses and evidence ie Froth floatation, hydraulic washing, gravity separation, magnetic separation or leaching.
4. Students test hypotheses and record findings. Each group will record its observations in the table enlisted above and should be able to link their deduction with the outcome of the analysis.

Revise (10 minutes)

1. Students will make adjustments to their hypothesis based on information gained in discussion or test findings and inform the mining authority of India as to how the existing processes maybe fine tuned in the light of innovative techniques they propose. The remedies should be workable in a physical environment.

Next, repeat the process with a second source of information.

Explore (25 minutes)

1 Teachers introduce the second source of information, the various methods of extraction.
2 Students will be introduced to the Hall's process, Blast furnace, Bessemer converter and Argentocyanide process .
3. Students record observations or evidence and appreciate the various purification techniques of metals.
4. Students identify relationships or patterns and form a hypothesis based on information gained.

Explain (20 minutes)

1. Teachers organize students into small groups or partners.
2. Students share first "hypothesis" with small group or a partner.
3. Teachers facilitate whole group discussion in which students share their hypotheses and evidence.
4. Students test hypotheses and record findings

Revise (10 minutes)

1. Students will make adjustments to their hypothesis based on information gained in discussion or test findings.

(Option to repeat this process with additional sources of information, each time resulting in an updated hypothesis.)

Apply (80 minutes)

1. Students reflect on outcomes and communicate findings.
2. Students use findings to draw conclusions and generate a solution to a problem. How to collect refined tin as its melting point is very low? / Why does food get spoiled in copper vessels? / Why are aluminium cookers unhealthy? What are the best alternatives and why? What steps has the Indian government taken to ensure strict compliance of high food grade metals to be employed in the making of cooking utensils?

Evaluate: Exemplar Response and/or Rubric

- Conduct a case study on three different metals in the kitchen and observe their response to weak and strong acids, weak and strong alkalis as well as neutral media and record their findings in the table below:

Treatment	Observation 1	Observation 2	Observation 3	Deduction

Additional Resources

Pinciples of inorganic chemistry by Dr O. P. Tandon

Wikipedia

CSR

Reader,s digest magazine

Options for Differentiation

- Possible modifications, adaptations or extension activities specific to this lesson: Create a padlet on metallurgical operations.

Credits

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