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Web Resources for Learning Mineralogy and Crystallography

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ABSTRACT: Mineralogy and Crystallography are two important branches of Geology and Mineralogy forms the foundation to learn Petrology. The web resources are of great help to study Mineralogy and Crystallography because of availability of complete database of minerals in a virtual and freely accessible mode. The authors have made an effort to compile web resources for learning Mineralogy and Crystallography, which when tapped, shall act as invaluable supplement to the classroom teaching- learning.

KEYWORDS: Web resources, Mineralogy, Crystallography.

I. INTRODUCTION

Education in India has witnessed transformation in last few years and Geoscience education is not an exception for that matter. In earlier days, the traditional chalk and duster method of teaching was supplemented with geological field excursions in various terrains. Now it is supplemented by power point presentations, animations, study material in pdf format, softwares, videos and virtual field trips. These modern tools and techniques save a lot of time, energy and money of both students as well as teachers. The driving force behind this transformation is the use of internet and the resources available on World Wide Web.

Mineralogy is the branch of Geology that deals with the study of physical, chemical and optical properties of minerals. A number of websites hosted by experienced teachers as well as geoscientists, full of exhaustive information about one or more of the above-mentioned aspects are available on the internet. The internet resources on Mineralogy include sites with charts displaying distinguishing properties of various mineral species, how to identify them and their mutual associations. The sites also include images of various minerals including their gem varieties. Few sites deal with the description of properties of thin section of minerals. Minerals serve as the building blocks for rocks. Thus, to learn about rocks, one must know the minerals well.

The study of minerals requires good collection of hand specimens and thin sections, so that the students can learn about them in an effective manner. The web resources for learning Mineralogy and Crystallography help the teachers and students to overcome the shortcomings they face due to paucity of funds to buy the specimens, availability of good quality equipment, sufficient lab space etc. With just a few mouse clicks, they can access world class collection of minerals, crystals and gem stones and learn about them in a virtual mode.

A few important web resources for Mineralogy and Crystallography are summarized in the Table-1.

Table-1.

S.No.	Website link	Description
1	https://opengeology.org/Mineralogy/	Free Textbook for College-Level Mineralogy Courses by Dexter Perkins
2	https://www.mindat.org/	Mindat.org is the world's largest open database of minerals, rocks, meteorites and the localities they come from.
3	http://www.minsocam.org/msa/DGT_Figures/	Interactive Mineralogy Illustrations by Melinda Darby Dyar and Mickey E. Gunter, Illustrations by Dennis Tasa
4	http://www.minsocam.org/msa/Monographs/mono03.html	Teaching Mineralogy-John B. Brady, David W. Mogk, and Dexter Perkins III, Editors. This book is an outgrowth of a



		workshop on teaching mineralogy held at Smith College in June 1996
5	https://www.rockptx.com/video-atlas-of-minerals-in-thin-section/	Video atlas of minerals in thin section
6	https://profiles.uonbi.ac.ke/cnyamai/classes/sgl-201-principles-mineralogy	Lecture notes on Mineralogy by Prof. Nyamai Christopher Munyao, Department of Geology, University of Nairobi.
7	https://egyankosh.ac.in/bitstream/123456789/58923/3/Block-1.pdf	Excellent study material on crystallography available on IGNOU website
8	http://egyankosh.ac.in/handle/123456789/58931	Excellent study material on Mineralogy available on IGNOU website
9	http://egyankosh.ac.in/handle/123456789/58944	Excellent study material on Optical Mineralogy available on IGNOU website
10	https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=8zYwEsyFCoiPyJIPmzHDxg==	Link to lecture notes of Mineralogy and Crystallography available on e-pgpathshala, an initiative of the MHRD under its National Mission on Education through ICT (NME-ICT) being executed by the UGC.
11	https://www.southalabama.edu/geology/haywick/GY302/302notes.htm	Lecture notes of Dr. Douglas W. Haywick, University of South Alabama
12	https://www2.tulane.edu/~sanelson/eens211/	Excellent Mineralogy and Crystallography lecture notes of Prof. Stephen A. Nelson, Department of Earth & Environmental Sciences, Tulane University.
13	http://www.sarahlambart.com/resources.html	Mineralogy Lecture handouts of Dr. Sarah Lambart, University of Utah
14	https://users.metu.edu.tr/lunel/	Mineralogy lecture notes
15	https://core.ac.uk/download/pdf/5220424.pdf	Optical Mineralogy lecture notes by ME Gunter
16	https://www.whitman.edu/geology/winter/Mineralogy/Selverstone%20Optical%20min3.ppt	Optical Mineralogy in a Nutshell--Use of the Petrographic Microscope in Three Easy Lessons
17	http://www.minsocam.org/msa/openaccess_publications.html	Guide to Thin Section Microscopy--an excellent open source tutorial by Michael M. Raith, Peter Raase, and Jurgen Reinhardt
18	http://www.brocku.ca/earthsciences/people/gfinn/optical/222lect.htm	Optical Mineralogy -- Greg Finn, Brock University; a complete set of lecture notes for an optical mineralogy class
19	http://funnel.sfsu.edu/courses/geol426/Handouts/mintable.pdf	Easy to use tables of optical properties of the rock-forming minerals.
20	https://geologyscience.com/geology/optical-properties-of-minerals/	Optical Properties of Minerals
21	https://gemkids.gia.edu/view-all-gemstones	An introduction to gem minerals
22	https://www.gemsociety.org/gemstone-encyclopedia/	Gemstone-Encyclopedia
23	https://www.minerals.net	Complete information guide to minerals & gemstones
24	http://rc.acharyainstitutes.in:8080/jspui/bitstream/123456789/597/1/Mineralogy%20for%20Petrologists.pdf	Text book of Mineralogy
25	http://www.minsocam.org/msa/OpenAccess_publications/McNamee_Gunter_Lab_Manual_index.html	Download link for <i>Mineralogy and Optical Mineralogy: Lab Manual</i>
26	http://microscopic.ro/	This website makes it easier to examine a thin section and to understand the characteristic properties of each mineral/rock without a petrographic microscope.



27	https://www.open.edu/openlearn/mod/oucontent/view.php?id=9265&printable=1	This website helps the user in systematic descriptions and identifications of minerals in rocks, observing them using images of thin sections viewed under a polarising microscope.
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II. CONCLUSION

The web resources in Mineralogy and Crystallography mentioned above, can act as supplement to the class room teaching- learning. The authors have compiled websites mentioned in the table during the course of teaching UG and PG students of Geology. The description of the sites is based on the opinion of the authors. The sites not mentioned in the table, are, by no means inferior in the quality of their content.

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