Collaborative Documents

What it is:
Activities that encourage students to work together in or out of the classroom by using on-line collaborative tools. Many possibilities – 3 examples are shown here. May be combined with an on-line peer review tool (*e.g.* iPeer or PRAZE).

Class Review

Implementation: Provide a review sheet online through Google Docs or a similar tool. Invite students to share the document and study together virtually

Minerals we need to know formula for highlighted in yellow
Elements in these mineral highlighted in orange

Hey guys, I made a mineral formula quiz on sporcle for this exam:
http://www.sporcle.com/games/acheronta/geol340-review
Let me know if there are any problems with it. :) -Adele

Sulfides
What are the major minerals in ocean crust?
plagioclase feldspar, augite, orthopyroxene, olivine
How do we learn about the composition and mineralogy of ocean crust?
dredging and drilling
What is MORB?
mid ocean ridge basalt
What is an ophiolite?
section of ocean crust that is uplifted and exposed above sea level
What are the basic parts of an ophiolite?
chert-pillow lavas-sheeted dikes-gabbro-ultramafic rocks
top———————————————————— >bottom
What is a hydrothermal vent?
where water seeps into the crust and get heated and dissolves metals and stuff. then rises and when it meets ocean water it precipitates to form a vent
How does it form?
water goes into pore spaces in rocks->water heats up-> water dissolves metals, sulfur->water rises->reacts with cold sea water and mineral precipitate from water (sulfides causes them to be black plumes)
Why do sulfides precipitate on hydrothermal vents?
the hot sulfur-metal rich water coming into contact with the cold sea water causes the metals and sulfur to combine and precipitate in the water
Where do the sulfur and metals that make up sulfide minerals in these vents come from?
the basaltic rock the water seeps into
What is the nature of chemical bonds in sulfides?
chemical bonding in the sulfides is less ionic than oxides, sulfur is significantly less electronegative than oxygen. Bonding is covalent or metallic depending on energy orbitals.
Know the mineral formulae for the seven sulfide minerals you have learned in this class:
Pyrite(FeS_2), Galena(PbS), Sphalerite((Zn,Fe)S), Pyrrhotite($Fe_{(1-x)}S$), Chalcopyrite($CuFeS_2$), Molybdenite(MoS_2), Cinnabar(HgS)
What are distinctive characteristics of each? What are common characteristics?Where are each of these minerals found?
SEE CHART

mineral	formula	distinctive characteristic	common characteristic	where they are found
pyrite	FeS_2	striated faces, cubic habit, H=6.5	biomineral, isometric	hydrothermal deposits,

Presentations

Implementation: Ask students to create a presentation using one of the many on-line presentations apps available. Provide a rubric showing how they will be evaluated. Students work together in small groups to prepare a presentation, and present it to the class.

Designed by Rachel Beane, Bowdoin College
On the Cutting Edge project

Wiki Page or Web Page

Implementation:
- Give an assignment with specific instructions and grading rubric. Students work in small groups over course of week.
- Students research and create a wiki or web page that describes topic, includes images, and cites sources.
- Evaluate their creations!

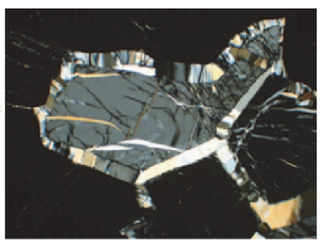
The assignment should:
- Allow students to investigate and learn information that is outside the prescribed coursework that interests them

Pyrope

Mineral formula: $Mg_3Al_2Si_3O_{12}$
Crystal system: Isometric
Crystal Habit: Dodecahedral; often found as granular
Hardness on Mohs scale: 7 - 7.5
Specific gravity: 3.56 gm/cc
Color: deep red
Luster: vitreous
Streak: white
Fracture: conchoidal
(Sources: 1, 2)

Small pyrope crystal, showing characteristic 'blood red' color and dodecahedral habit. Scale: crystal is 2.5mm (Mindat).

Pyrope in the metamorphic rock Eclogite. The accompanying green mineral is pyroxene. Image size: 13cm (Sandatlas)



A coesite and quartz inclusion in pyrope garnet. Characteristic radial fractures in the pyrope are visible. It was the unlikely presence of nearly pure pyrope that encouraged Chopin to check for coesite. Picture width: 1.3mm (Elements).

Interesting Fact:
In 1984, geologist Christian Chopin published a paper describing his sampling of metamorphic coesite and pure pyrope in the Western Alps. His seemingly minor find went on to change the way scientists understood plate tectonics. Previously, diagrams showing the tectonic movement of continental plates had restricted such movement to the normal thickness of the continental crust. Pyrope has a high-pressure stability field, and pyrope-rich garnet had previously only been found in rocks with origins in the mantle. Chopin's findings showed that crustal rocks had penetrated much deeper into the earth than previously believed, traveling down at least 100km. The discovery of this rare pyrope and its inclusions ultimately brought around a new theory of continental tectonics (Elements, European Journal of Mineralogy).

Chopin's original article: Coesite and pure pyrope in high-grade blueschists of the Western Alps: a first record and some consequences.

http://serc.carleton.edu/NAGTWorkshops/undergraduate_research/collaborate.html