Ontario Society of Environmental Educators
April 30, 2010
Seneca College King Campus

Rocks & Minerals

Don Lee and Karin Kell

www.leenvironmental.com

Summary

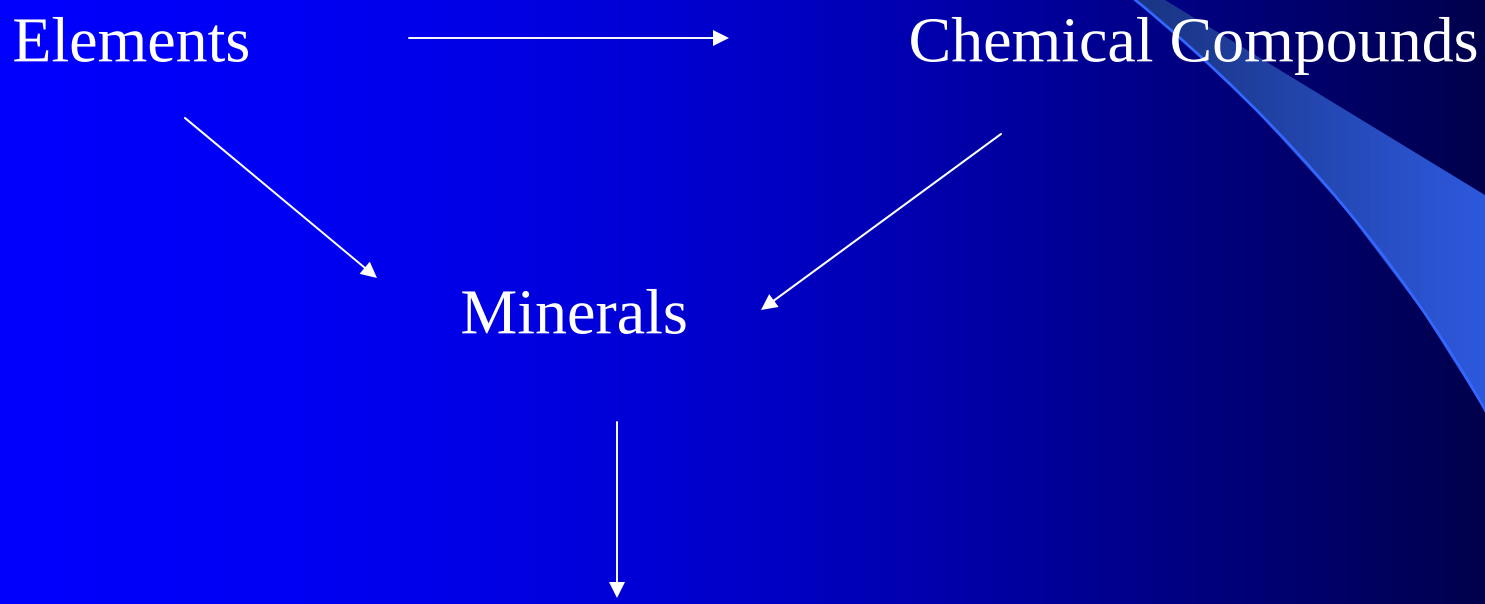
- Tools of the geologists
- Safety
- Classification flow chart
- Define element, compound, mineral, rock
- Properties of minerals
- Show samples
- Rock classification

GEOLOGIST TOOLS

Classroom Safety

- Check for allergies
- Wash hands if handling samples
- Check with board policy about restricted and banned substances
- STAO *Be Safe* and *Stay Safe* Documents

FLOW DIAGRAM of minerals



Definitions

- Element = one type of atom.
- Chemical Compound = 2 or more elements in definite ratio
- Mineral = 1 or more elements that have specific properties
- Rocks = 1 or more minerals, compose earth’s crust

Application to Grade 4

*Cross Curricular – Language & Math

*Interactive Groups – Roles and Levels

*Pre-Assessment, Formative, Summative

- Activate Prior Knowledge:

Organizer sample KWL (Know, Want, Learned)

Shared Experiences, Guided Reading, Computers

Uses of Rocks or Minerals (Daily Awareness)

Properties of Minerals

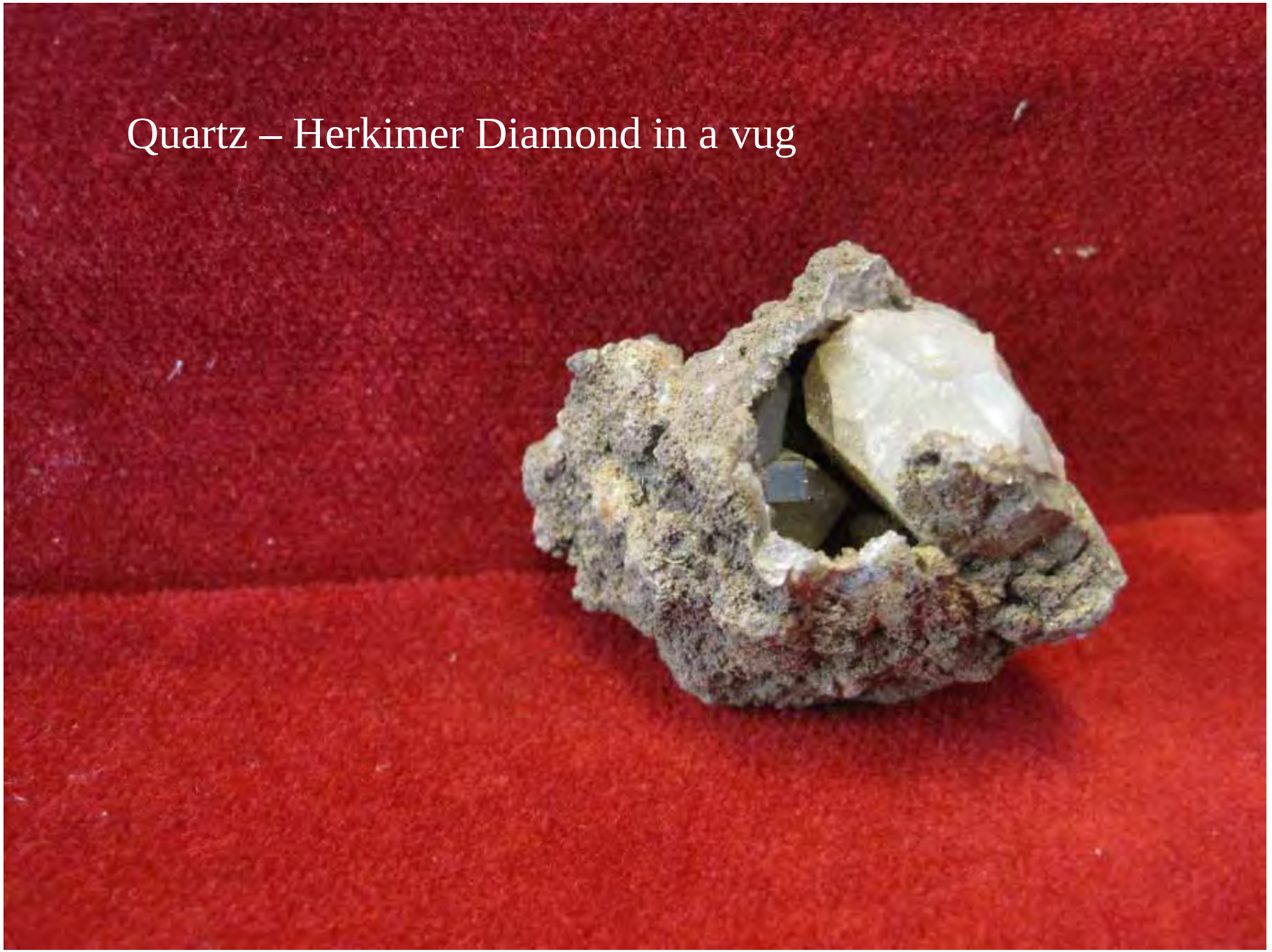
- Colour/Streak
- Lustre/Transparency
- Hardness/Tenacity
- Density
- Fracture/Cleavage
- Crystal structure
- Special properties


Same mineral may have different colours
Quartz
Smoky Quartz Brazil

Hexagonal Quartz Crystals

Solution Quartz

Quartz – Herkimer Diamond in a vug



Sulphur (yellow) in a vein

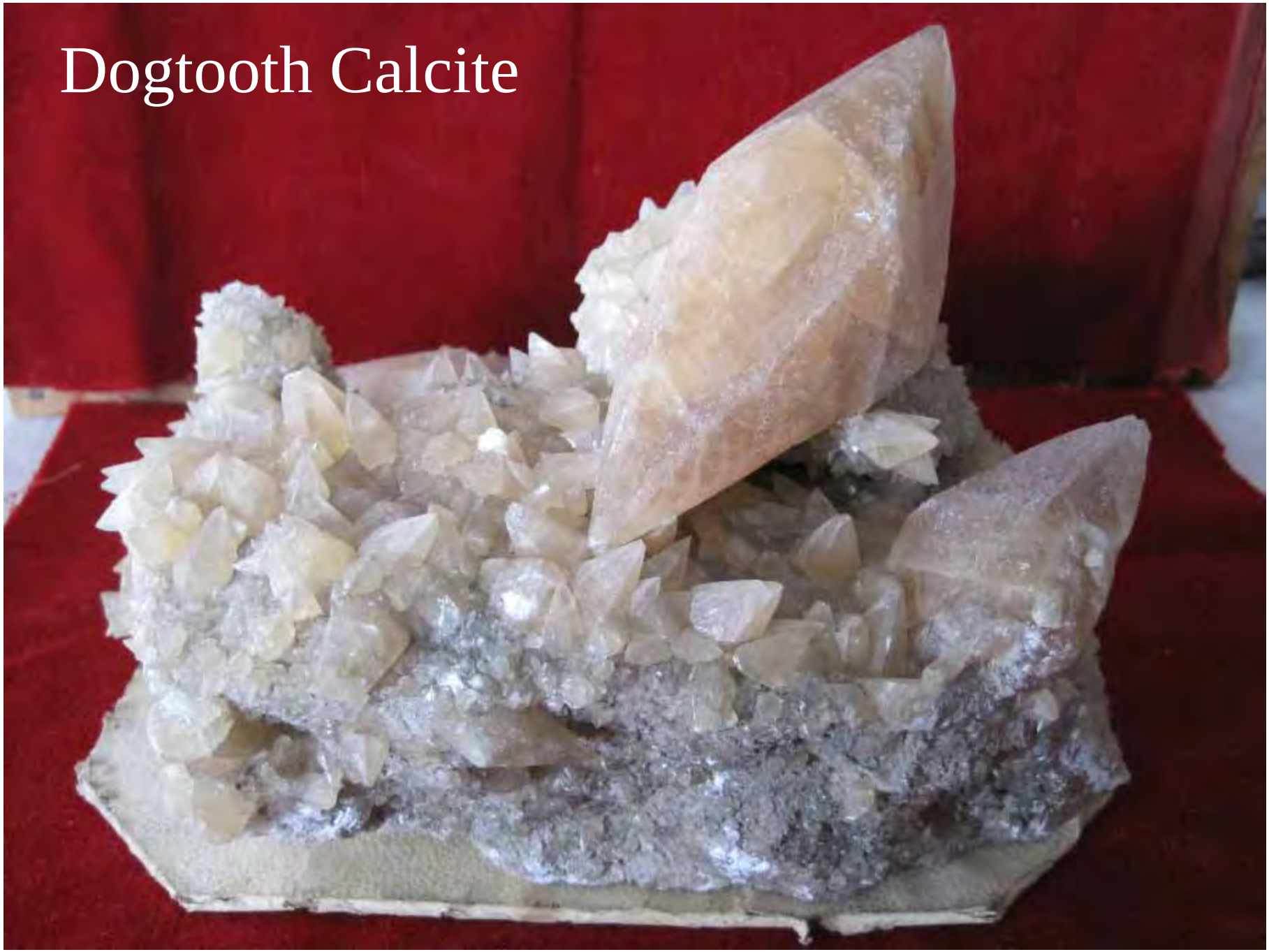
Geode to Agate

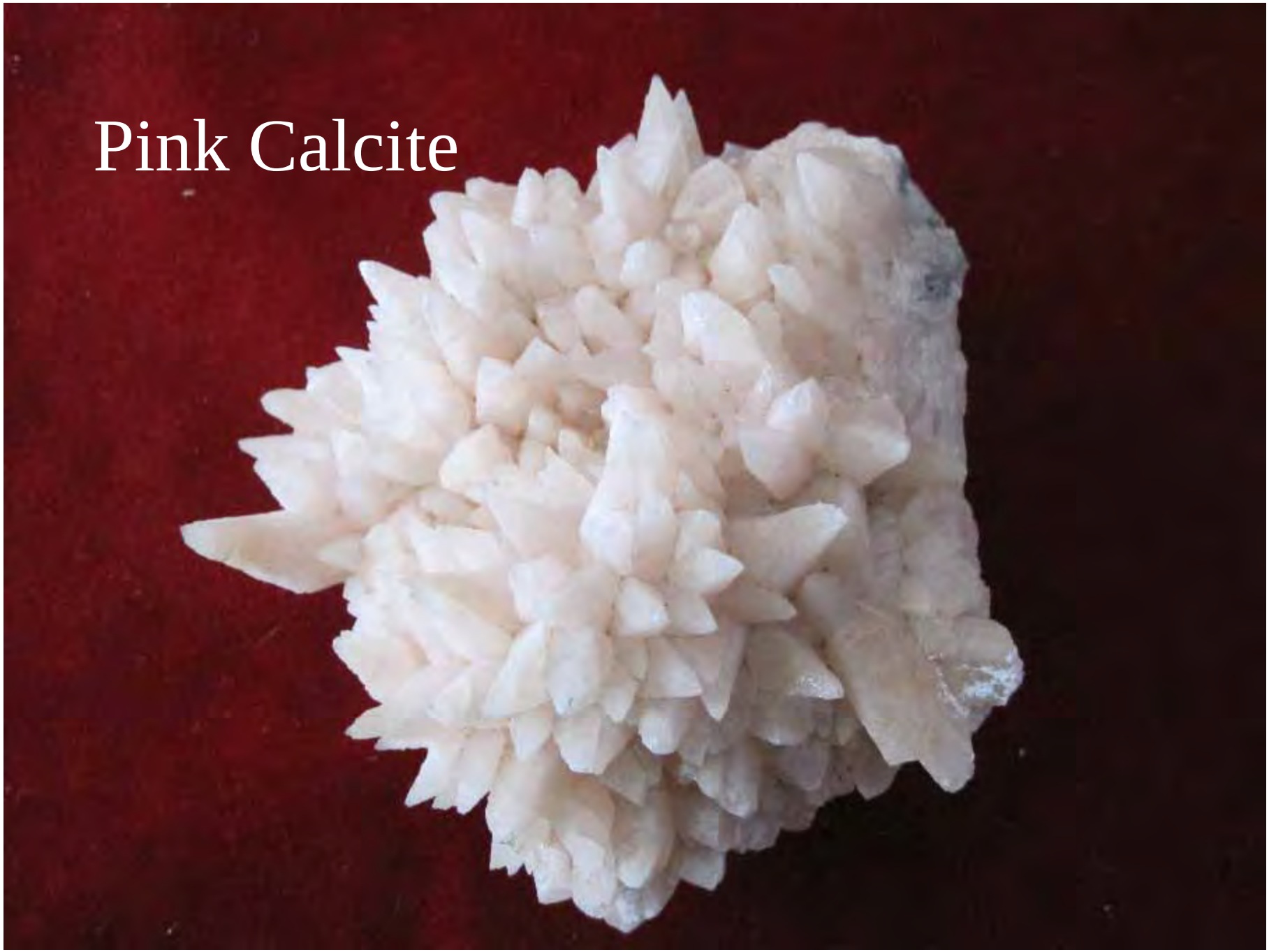

Pyrite cubes
Galena cubes

Garnet: Almandime - hexoctahedral

Dogtooth Calcite

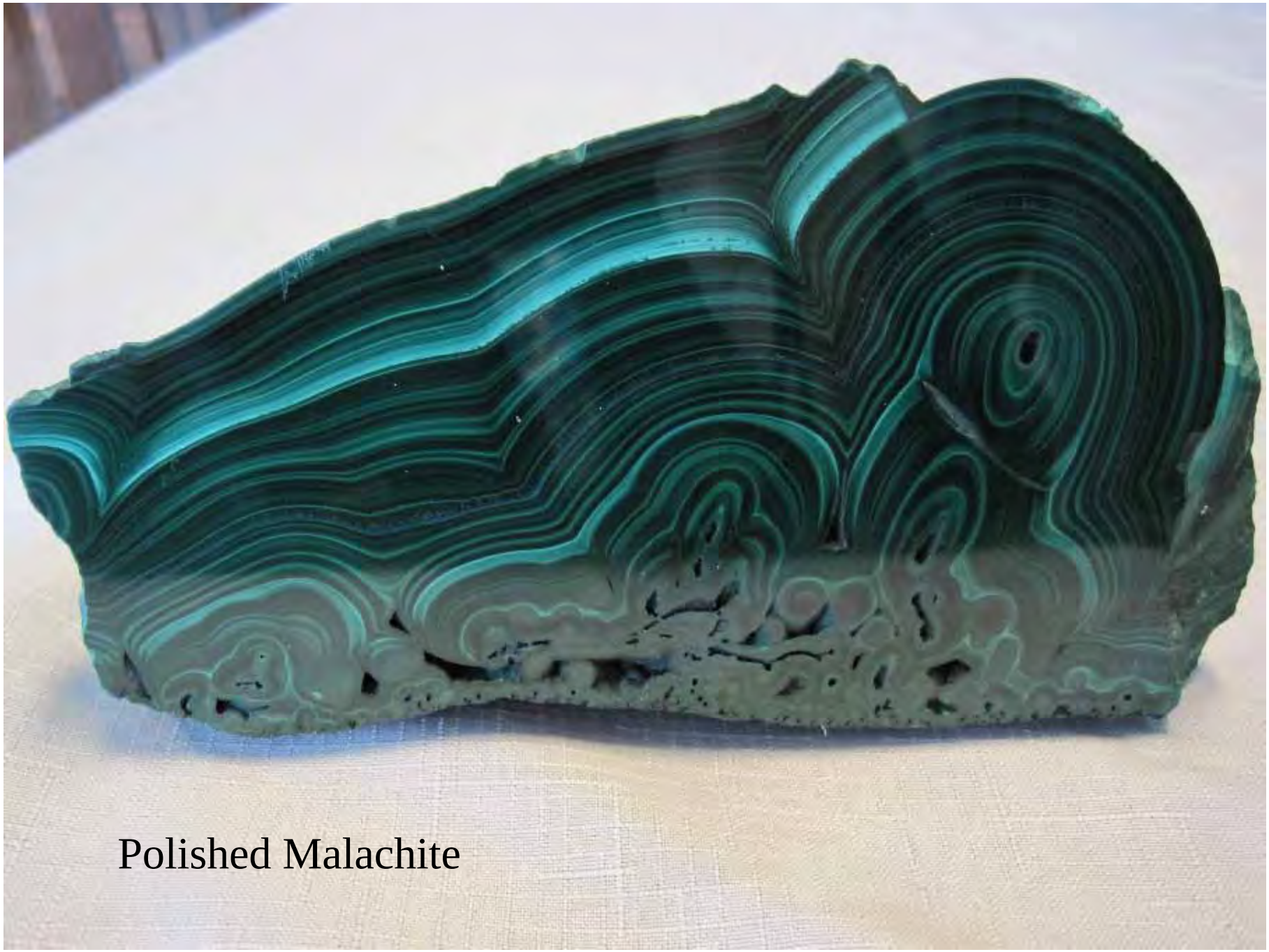
Dogtooth Calcite




Pink Calcite


Pink Calcite


Malachite



Polished Malachite

Polished Malachite

Sand Selenite

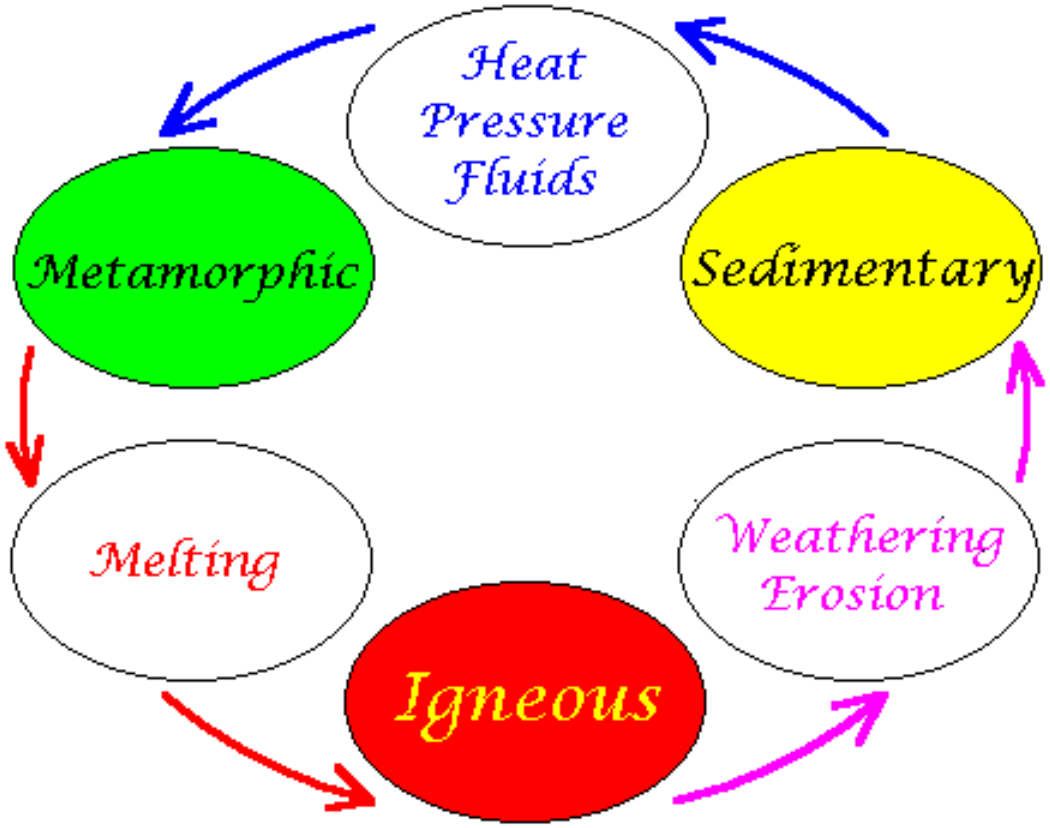

Barite


Tabular Crystal:
Wulfenite

Gemstone: Ruby


Crysoberyl

Rock Cycle


Heat
Pressure
Fluids
Metamorphic
Sedimentary
Melting
Weathering
Erosion
Igneous

Igneous

Metamorphic

Sedimentary

Wentworth scale of particle size

φ scale	size range	Wentworth range	Wentworth name	other names
-8 to -∞	256-∞kk	10.1-∞ in	boulder	gravel
-6 to -8	64–256 mm	2.5–10.1 in	cobble	gravel
-2 to -6	4–64 mm	0.157–2.5 in	pebble	gravel
-1 to -2	2–4 mm	0.079–0.157 in	granule	gravel
0 to -1	1–2 mm	0.039–0.079 in	very coarse sand	sand
1 to 0	0.5–1 mm	0.020–0.039 in	coarse sand	sand
2 to 1	0.25–0.5 mm	0.010–0.020 in	medium sand	sand
3 to 2	125–250 μm	0.0049–0.010 in	fine sand	sand
4 to 3	62.5–125 μm	0.0025–0.0049 in	very fine sand	sand
5 to 4	3.9–62.5 μm	0.00015–0.0025 in	silt	mud
∞ to 8	1/∞-3.9 μm	1/∞ –0.00015 in	clay	mud
∞ to 10	1/∞-1 μm	1/∞–0.000039 in	colloid	mud

Geology Lab

Presenters:

DON LEE

AND

KARIN KELL

www.leenvironmental.com


1
STATION 1
FLUORITE


1
STATION 1
FLUORITE
3
STATION 1
CELESTITE
2
STATION 1
PYRITE
5
STATION 1
GALENA
7
STATION 1
SULPHUR
1
STATION 1
SPHALERITE
4
STATION 1
QUARTZ
6


STATION 2A
LIMONITE
3
STATION 2A
QUARTZ
2A
STATION 2A
BAUXITE
2
5
STATION 2A
ASBESTOS
5
STATION 2A
GRAPHITE
11
STATION 2A
CHALCOPYRITE
1
STATION 2A
GYPSUM
4
10
STATION 2A
SPECULARITE
(HEMATITE)
10


2B
STATION 2B
FELDSPAR
STATION 2B
PENTLANDITE

THE SCALE OF HARDNESS OF MINERALS

One of the properties by which minerals are tested and classified is hardness. The degree of hardness of any material is compared with that of ten standards, nine of which are included in this set (diamond omitted). A given mineral would, for example, be described as having "hardness No. 4" or "hardness 6.5." To make the test, the particular mineral is scratched in turn by those of the Scale, remembering that a harder mineral will leave a scratch mark on a softer one only.

THE SCALE OF HARDNESS

1. Talc	3. Calcite	5. Apatite	7. Quartz	9. Corundum
2. Selenite	4. Fluorite	6. Microcline	8. Topaz	10. Diamond

(Diamond omitted from this collection)

STREAK PLATE. Another important property in the determination of minerals is the color of their powdery residue after they have been drawn across a streak plate, such as this slab of unglazed porcelain. Useful with all but very hard minerals.

Ward's Natural Science Establishment Inc.
Rochester, New York **Monterey, California**


1
5
6
7
3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The SCALE OF HARDNESS
1. Talk 2. Calcite 3. Apatite 7. Quartz 9. Corundum
2. Gypsum 4. Fluorite 5. Hornblende 8. Topaz 10. Diamond
(Hardness ground from the collection)
STREAK PLATE. Another important property in the determination of minerals is the color of their powdery residue after they have been drawn across a streak plate, such as the slab of unglazed porcelain. Useful with all but very hard minerals.
Ward's Natural Science Establishment Inc.
Rochester, New York Monterey, California
5
6
3


3
STATION 3
HARDNESS


3
STATION 3
TENACITY
COPPER
2
TENACITY
TALC
4
STATION 3
TENACITY
QUARTZ
1


4
STATION 4
QUARTZ
2
STATION 4
PYRITE
4
STATION 4
HALITE
6
STATION 4
GALENA
1
CASSITERITE
5
GARNET


WARD'S
CONTACT GONIOMETER
WARD'S NATURAL SCIENCE
Made in U.S.A.
5

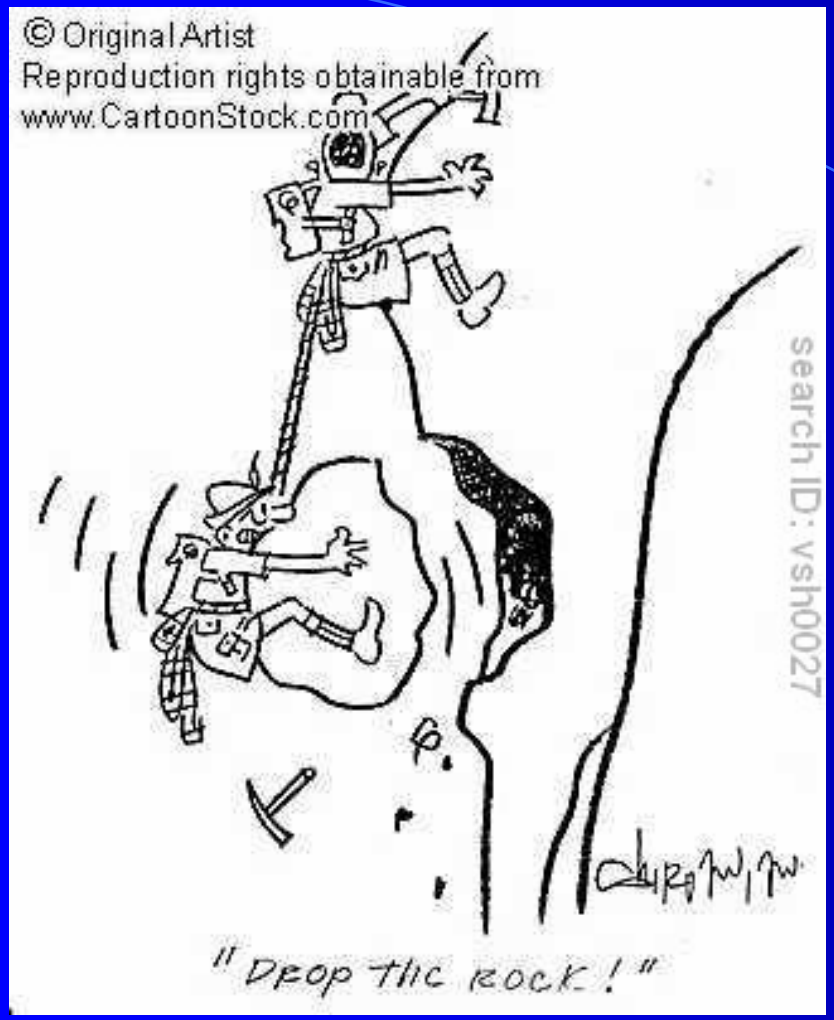

5
3
STATION 5
CALCITE
3
STATION 5
FLUORITE
2
STATION 5
PYRITE
1
6
STATION 5
OBSIDIAN
(RHYOLITE BOCO)
6
5
STATION 5
MUSCOVITE MICA
5
4
STATION 5
QUARTZ
4


6
STATION 6
PYRITE
2
STATION 6
GYPSUM
4
STATION 6
QUARTZ
1
STATION 6
TOURMALINE
3

Why is the sample bottom left encapsulated in this photo?

Asbestos is a Designated Substance that cannot be brought into schools. Internet has excellent photos.

Rock Humour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"DROP THE ROCK!"


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