

Mineral Madness

YEAR 8
EARTH AND SPACE SCIENCES



QGC

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Future Makers

Future Makers is an innovative partnership between Queensland Museum Network and Shell's QGC business aiming to increase awareness and understanding of the value of science, technology, engineering and maths (STEM) education and skills in Queensland.

This partnership aims to engage and inspire people with the wonder of science, and increase the participation and performance of students in STEM-related subjects and careers — creating a highly capable workforce for the future.

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This teacher resource is produced by Future Makers, a partnership between Queensland Museum Network and Shell's QGC business, with support from the Australian Research Council and other parties to ARC Linkage Project LP160101374: The University of Queensland, Australian Catholic University Limited and Queensland Department of Education.

ENGAGE

Mineral Madness

Teacher Resource

Rocks are made up of minerals. Minerals are naturally occurring inorganic solid substances. There are many thousands of types of minerals found on Earth and quite a few in lunar rocks and meteorites.

Minerals are made up of chemical elements and have a definite chemical composition. Some minerals, such as diamond, gold and sulfur, contain only one chemical element; these minerals are known as native elements. Most minerals are chemical compounds; these minerals contain a combination of chemical elements. It is the specific chemical composition and crystalline structure of each mineral that determines its properties. These characteristics can also be used to classify a mineral into one of several groups, including the native elements, sulphides, oxides, halides, carbonates, sulfates and phosphates.

In this activity, students explore the chemical composition of minerals by playing the game *Mineral Madness*. *Mineral Madness* is based on the card game 'Rummy' and follows a similar style of play. Within *Mineral Madness*, students identify the chemical formula of varied minerals, before using a periodic table and element cards to form their minerals. Instructions and game cards can be found on the following pages.

After engaging with the game, students could:

- Sort the minerals based on their elemental groups, and research the characteristics of these groups and others not included in the *Mineral Madness* selection of minerals.
- Investigate each mineral, including its date of discovery, who first described the mineral, how it was named, and the historic and current uses of the mineral.
- Explore which minerals form various igneous, metamorphic and sedimentary rocks.

Curriculum Links

Science

YEAR 8

Science Understanding

Sedimentary, igneous and metamorphic rocks contain minerals and are formed by processes that occur within Earth over a variety of timescales (ACSSU153)

Science Inquiry Skills

Communicate ideas, findings and evidence based solutions to problems using scientific language, and representations, using digital technologies as appropriate (AC SIS148)

General Capabilities

Literacy

Comprehending texts through listening, reading and viewing

Mineral Madness

Student Resource

Mineral Madness Game Instructions

Players: 2 – 5 players

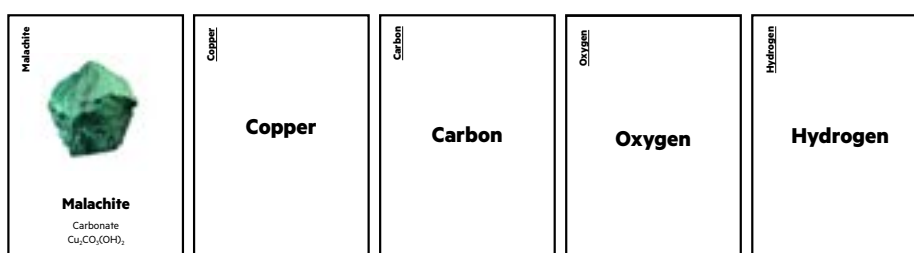
Game Components: 16 x mineral cards
48 x element cards
1 x periodic table per player

Objective: Explore the chemical composition of minerals. Pick up and use element cards to form minerals. The first person to use all of the element and mineral cards in their hand is the winner.

Game Play: Select one person to be the dealer. The dealer shuffles and deals the cards to each player. When playing with two, three or four players, each player receives ten cards. When playing with five players, each player receives six cards.

After dealing, the dealer places the remaining cards face-down in a pile in the middle of the group. The dealer flips over the first card to create a discard pile. The person sitting to the left of the dealer plays first.

The first player can either pick up the card on the discard pile or the top card from the main pile. If they can combine their element cards to form a mineral card in their hand, they may do so. One element card may be used to represent elements that appear multiple times in a mineral's chemical formula, for example:



These cards can then be placed face-up in front of the player. The player discards one mineral or element card from their hand, face-up onto the discard pile, to end their turn. Play moves to the next player on the left.

Play continues until one player has no cards remaining in their hand.

Tips: Players can use a periodic table to help identify the chemical elements that form specific minerals.

A wild card can be used to represent any one element.

Azurite



Azurite

Carbonate
 $\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$

Calcite



Calcite

Carbonate
 CaCO_3

Chalcopyrite



Chalcopyrite

Sulfide
 CuFeS_2

Diamond



Diamond

Native mineral
C

Orthoclase Feldspar



Orthoclase Feldspar

Silicate
 KAlSi_3O_8

Fluorite



Fluorite

Halide
 CaF_2

Graphite



Graphite

Native mineral
C

Galena



Galena

Sulfide
 PbS

Halite



Halite

Halide
 NaCl

Haematite



Haematite

Oxide
 Fe_2O_3

Kyanite



Kyanite

Nesosilicate
 Al_2SiO_5

Malachite



Malachite

Carbonate
 $\text{Cu}_2\text{CO}_3(\text{OH})_2$

Pyrite



Pyrite

Sulfide
 FeS_2

Quartz



Quartz

Oxide
 SiO_2

Rutile



Rutile

Oxide
 TiO_2

Talc



Talc

Silicate
 $\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$

<div><div><u>Copper</u></div><div>Copper</div></div>	<div><div><u>Copper</u></div><div>Copper</div></div>	<div><div><u>Copper</u></div><div>Copper</div></div>
<div><div><u>Carbon</u></div><div>Carbon</div></div>	<div><div><u>Carbon</u></div><div>Carbon</div></div>	<div><div><u>Carbon</u></div><div>Carbon</div></div>
<div><div><u>Carbon</u></div><div>Carbon</div></div>	<div><div><u>Carbon</u></div><div>Carbon</div></div>	<div><div><u>Oxygen</u></div><div>Oxygen</div></div>

<div><div><u>Oxygen</u></div><div>Oxygen</div></div>	<div><div><u>Oxygen</u></div><div>Oxygen</div></div>	<div><div><u>Oxygen</u></div><div>Oxygen</div></div>
<div><div><u>Oxygen</u></div><div>Oxygen</div></div>	<div><div><u>Oxygen</u></div><div>Oxygen</div></div>	<div><div><u>Oxygen</u></div><div>Oxygen</div></div>
<div><div><u>Oxygen</u></div><div>Oxygen</div></div>	<div><div><u>Oxygen</u></div><div>Oxygen</div></div>	<div><div><u>Hydrogen</u></div><div>Hydrogen</div></div>

<div>Hydrogen</div> <div>Hydrogen</div>	<div>Hydrogen</div> <div>Hydrogen</div>	<div>Calcium</div> <div>Calcium</div>
<div>Calcium</div> <div>Calcium</div>	<div>Iron</div> <div>Iron</div>	<div>Iron</div> <div>Iron</div>
<div>Iron</div> <div>Iron</div>	<div>Sulphur</div> <div>Sulphur</div>	<div>Sulphur</div> <div>Sulphur</div>

Sulphur

<div><div><u>Lead</u></div><div>Lead</div></div>	<div><div><u>Sodium</u></div><div>Sodium</div></div>	<div><div><u>Chlorine</u></div><div>Chlorine</div></div>
<div><div><u>Titanium</u></div><div>Titanium</div></div>	<div><div><u>Silicon</u></div><div>Silicon</div></div>	<div><div><u>WILD</u></div><div>WILD</div></div>
<div><div><u>WILD</u></div><div>WILD</div></div>	<div><div><u>WILD</u></div><div>WILD</div></div>	<div><div><u>WILD</u></div><div>WILD</div></div>

WILD

WILD

WILD

WILD

WILD

WILD

PERIODIC TABLE OF THE ELEMENTS

1 1.0079 H HYDROGEN		2 4.0026 He HELIUM																																																			
3 6.941 Li LITHIUM		4 9.0122 Be BERYLLIUM		5 10.811 B BORON		6 12.011 C CARBON		7 14.007 N NITROGEN		8 15.999 O OXYGEN		9 18.998 F FLUORINE		10 20.180 Ne NEON																																							
11 22.990 Na SODIUM		12 24.305 Mg MAGNESIUM		13 26.982 Al ALUMINIUM		14 28.086 Si SILICON		15 30.974 P PHOSPHORUS		16 32.065 S SULPHUR		17 35.543 Cl CHLORINE		18 39.948 Ar ARGON																																							
19 39.098 K POTASSIUM		20 40.078 Ca CALCIUM		21 44.956 Sc SCANDIUM		22 47.867 Ti TITANIUM		23 50.942 V VANADIUM		24 51.996 Cr CHROMIUM		25 54.938 Mn MANGANESE		26 55.845 Fe IRON		27 58.933 Co COBALT		28 58.933 Ni NICKEL		29 63.546 Cu COPPER		30 65.38 Zn ZINC		31 69.723 Ga GALLIUM		32 72.64 Ge GERMANIUM		33 74.922 As ARSENIC		34 78.96 Se SELENIUM		35 79.904 Br BROMINE		36 83.798 Kr KRYPTON																			
37 85.468 Rb RUBIDIUM		38 87.62 Sr STRONTIUM		39 88.906 Y YTRIUM		40 91.224 Zr ZIRCONIUM		41 92.906 Nb NIOBIUM		42 95.96 Mo MOLYBDENUM		43 98 Tc TECHNETIUM		44 101.07 Ru RUTHENIUM		45 102.91 Rh RHODIUM		46 106.42 Pd PALLADIUM		47 107.87 Ag SILVER		48 112.41 Cd CADMIUM		49 114.82 In INDIUM		50 118.71 Sn TIN		51 121.76 Sb ANTIMONY		52 127.60 Te TELLURIUM		53 126.90 I IODINE		54 131.29 Xe XENON																			
55 132.91 Cs CAESIUM		56 137.33 Ba BARIUM		57 - 71 La-Lu Lanthanides		72 178.49 Hf HAFNIUM		73 180.95 Ta TANTALUM		74 183.84 W TUNGSTEN		75 186.21 Re RHENIUM		76 190.23 Os OSMIUM		77 192.22 Ir IRIDIUM		78 195.08 Pt PLATINUM		79 196.97 Au GOLD		80 200.59 Hg MERCURY		81 204.38 Tl THALLIUM		82 207.20 Pb LEAD		83 208.98 Bi BISMUTH		84 209 Po POLONIUM		85 210 At ASTATINE		86 222 Rn RADON																			
87 223 Fr FRANCIUM		88 226 Ra RADIUM		89 - 103 Ac-Lr Actinides		104 267 Rf RUTHERFORDIUM		105 268 Db DUBNIUM		106 269 Sg SEABORGIUM		107 271 Bh BOHRLIUM		108 277 Hs HASSIUM		109 276 Mt MEITNERIUM		110 281 Ds DARMSTADTIUM		111 280 Rg ROENTGENIUM		112 285 Cn COPERNICIUM		113 284 Uut UNUNTRIUM		114 289 Fl FLEROVIUM		115 288 Uup UNUNPENTIUM		116 292 Lv LIVERMORIUM		117 294 Uus UNUNSEPTIUM		118 294 Uuo UNUNOCTIUM																			
57 138.91 La LANTHANUM		58 140.12 Ce CERIUM		59 140.91 Pr PRASEODYMIUM		60 144.24 Nd NEODYMIUM		61 145 Pm PROMETHIUM		62 150.36 Sm SAMARIUM		63 151.96 Eu EUROPIUM		64 157.25 Gd GADOLINIUM		65 158.93 Tb TERBIUM		66 162.50 Dy DYSPROSIUM		67 164.93 Ho HOLMIUM		68 167.26 Er ERBIUM		69 168.93 Tm THULIUM		70 173.05 Yb YTTERIUM		71 174.97 Lu LUTETIUM																									
89 227 Ac ACTINIUM		90 232.04 Th THORIUM		91 231.04 Pa PROTACTINIUM		92 238.03 U URANIUM		93 237 Np NEPTUNIUM		94 244 Pu PLUTONIUM		95 243 Am AMERICIUM		96 247 Cm CURIUM		97 247 Bk BERKELIUM		98 251 Cf CALIFORNIUM		99 252 Es EINSTEINIUM		100 257 Fm FERMIUM		101 258 Md MENDELEVIUM		102 259 No NOBELIUM		103 262 Lr LAWRENCIUM																									