Mineral Supertrumps: Details and rules of the game

Mineral Supertrumps is a game designed to help players learn about the properties and uses of economically-significant and common rock-forming minerals. The pack consists of 54 mineral cards and 6 "supertrump" cards (see the list below of card names). Each mineral card includes information about the mineral such as the generic chemical formula, the classification, crystal system, the geological environment where the mineral is commonly found or formed (igneous, metamorphic, sedimentary, or the mantle), as well as information in the five playing categories (or trumps) of *Hardness, Specific Gravity, Cleavage, Crustal Abundance, and Economic Value*. The first three trump categories relate to distinct physical properties of the mineral, while last two categories rate the importance of the mineral in terms of abundance in the Earths crust (continental and oceanic) and value to modern societies.

The cards are also color-coded by mineral groups: silicates = light green, oxides = blue, sulfides = orange, carbonates = light brown, phosphates = purple, sulfates = light blue, halides = pink, native elements = white.

Number of players: 3 to 5

Objective: To be the first player to lose all of your cards

How to play:

1. A dealer (randomly chosen) shuffles the cards and deals each player 8 cards. Each player can look at their cards, but should not show them to other players. The remaining card pack is placed face down on the table.

2. The player to the left of the dealer goes first by placing a mineral card on the table. The player must state the mineral name, one of the five trump categories (i.e., either *Hardness, Specific Gravity, Cleavage, Crustal Abundance, or Economic Value*), and the top value of that category. For example, a player placing the Glaucophane card may state "Glaucophane, Specific Gravity, 3.2"

3. The player next to the left takes the next turn. This player must play a mineral card that has a higher value in the trump category than the card played by the previous player. In the case of the example of the Glaucophane card above, the player must place a card that has a value for specific gravity above 3.2. The game continues with the next player to the left, and so on.

4. If a player does not have any mineral cards that are of higher value for the specific trump category being played, then the player must pass and pick up one card from the card pack on the table. The player then cannot play again until all but one player has passed, or until another player throws a supertrump card to change the trump category, as described below. A player is allowed to pass even if they still hold cards that could be played.

5. If the player has a supertrump card (*The Miner, The Geologist, The Geophysicist, The Petrologist, The Mineralogist, The Gemmologist*) they may play this card at any of their turns. By placing a supertrump card, the player changes the trump category according to the instructions on the supertrump card. The player then plays a mineral card of their choice to resume play. At this stage, any other player who had passed on the previous round is now able to play again. If a player happens to hold both *The Geophysicist* card and the *Magnetite* card in their hand, then that player can place both cards together to win the round.

6. The game continues with players taking turns to play cards until all but one player has passed. The last player then gets to lead out the next round and chooses the trump category to be played.

7. The winner of the game is the first player to lose all of their cards. The game continues until all but one player (i.e., the loser) has lost their cards.

Information on trump categories:

Hardness: relates to Moh's hardness scale of minerals from 1 to 10. Where a range of values is presented, the highest value should be used.

Specific Gravity: in grams per cubic centimeter. Where a range of values is presented, the highest value should be used.

Cleavage: refers to the number of cleavage planes and how well the planes are typically expressed in the crystal. For example, "1 perfect, 2 poor" means the mineral has 1 perfect cleavage plane, and 2 poor cleavage planes. The order of ranking from lowest to highest is:

none ➔ poor/none ➔ 1 poor ➔ 2 poor ➔ 1 good ➔ 1 good, 1 poor ➔ 2 good ➔ 3 good ➔ 1 perfect ➔ 1 perfect, 1 good ➔ 1 perfect, 2 good ➔ 2 perfect, 1 good ➔ 3 perfect ➔ 4 perfect ➔ 6 perfect.

Crustal abundance: is ranked from lowest to highest as: ultratrace ➔ trace ➔ low ➔ moderate ➔ high ➔ very high.

Economic value: is ranked from lowest to highest as: trivial ➔ low ➔ moderate ➔ high ➔ very high ➔ I'm rich!

Strategies:

Like many card games, there are strategies that can increase the chance of winning. Obviously the more a player can remember about the mineral cards the better, particularly if he/she can remember which cards have been played already. The cards with high values in various trump categories and Supertrump cards should be used to try and win a hand. When leading out a new round a player should try to begin with a card that tends to have low

values for many categories; these cards are difficult to get rid of otherwise. Players should be aware of what other players are throwing or passing on. This information can help the player to decide how to steer the game (i.e., which trump category to choose) in your favour.

The cards may be used in other ways to help learn aspects of mineralogy. They can be used a flash cards for rote learning, or can be used to play a mineralogy version of Celebrity Head.

Sources of information:

The game was devised and designed by Carl Spandler, and is in part based on the "Top Trumps" card game series. Mineral information was collated from the following sources:

Deer, W.A., Howie, R.A., & Zussman, J. (1992) An introduction to the rock-forming minerals (2nd ed.). Longman Group Ltd, Essex.

Johnsen, O., (2007) Minerals of the world. Princeton University Press, New Jersey.

Nesse, W.D. (2004) Introduction to optical mineralogy (3rd ed.). Oxford University Press, Oxford.

Mindat.org website (http://www.mindat.org).

Webminerals website (http://www.webmineral.com).

Mineral images were obtained from open-source internet sites including:
http://www.sandatlas.org,
http://www.mindat.org
http://www.amazonsupply.com
http://www.minerals.net

The card game can be obtained by printing the electronic file of the cards that is included as a supplementary file with this paper. Alternatively, high quality professionally-printed card packs are available at cost price by contacting Carl Spandler.

For more information, contact:

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Mineral Cards:

Silicate minerals:

Quartz
Plagioclase
Orthoclase
Biotite
Muscovite
Hornblende
Actinolite
Glaucophane
Olivine
Garnet
Titanite
Zircon
Augite
Orthopyroxene
Chlorite
Antigorite
Talc
Kaolinite
Andalusite
Kyanite
Sillimanite
Staurolite
Epidote
Tourmaline
Topaz
Beryl

Sulfide minerals:

Pyrite
Pyrrhotite
Chalcopyrite
Galena
Sphalerite
Molybdenite

Sulfate minerals:

Gypsum
Barite

Phosphate minerals:

Apatite
Monazite

Carbonate minerals:

Calcite
Dolomite
Magnesite
Siderite

Oxide minerals:

Magnetite
Hematite
Chromite
Ilmenite
Rutile
Corundum
Cassiterite

Hydroxide minerals:

Gibbsite
Goethite

Halide minerals:

Halite
Fluorite

Native elements:

Gold
Diamond
Graphite

Supertrump Cards:

The Miner: *changes the trumps category to Economic Value*

The Petrologist: *changes the trumps category to Crustal Abundance*

The Gemmologist: *changes the trumps category to Hardness*

The Mineralogist: *changes the trumps category to Cleavage*

The Geophysicist: *changes the trumps category to Specific Gravity (or throw magnetite to win the hand)*

The Geologist: *change to trumps category of your choice*