

# CARD SET 1

## BARIUM ( $^{137}_{56}\text{Ba}$ )



Baryte ( $\text{BaSO}_4$ )

Source: Colecciones del Museo Histórico Minero D. Felipe de Borbón y Grecia. ETSIME-UPM.

**Property:**  
High specific gravity.

## BISMUTH ( $^{208}_{83}\text{Bi}$ )



Bismuthinite ( $\text{Bi}_2\text{S}_3$ )  
[By-product of Pb and W extraction]

Source: Colecciones del Museo Histórico Minero D. Felipe de Borbón y Grecia. ETSIME-UPM.

**Property:**  
(Sn-Bi) Low melting point.

## ANTIMONY ( $^{121}_{51}\text{Sb}$ )



Antimonite ( $\text{NaSb}(\text{OH})_4$ )

Source: Colecciones del Museo Histórico Minero D. Felipe de Borbón y Grecia. ETSIME-UPM.

**Property:**  
Slow development of ignition.

## BORON (borates) ( $^{10}_5\text{B}$ )



Boracite ( $\text{Mg}_3\text{B}_7\text{O}_{13}\text{Cl}$ )

Source: Colecciones del Museo Histórico Minero D. Felipe de Borbón y Grecia. ETSIME-UPM.

**Property:**  
Enhance stain removal and bleaching.



Weighting agent in drilling fluids (Oil production)



Fusible alloys in solders  
(replacement of harmful metals, such as lead)



Flame-retardant plastics



Laundry detergents and industrial cleaning products



## PLATINUM ( $^{195}_{78}\text{Pt}$ )



Ores of nickel and copper  
*Source: Wikipedia.*

**Property:**  
Platinum black –  
Catalyst.

## WHITE PHOSPHORUS ( $^{30}_{15}\text{P}$ )



White phosphorus  
powder ( $\text{P}_4$ )

*Source: Wikipedia*

**Property:**  
Very reactive element  
with the soil.

## THULIUM ( $^{168}_{69}\text{Tm}$ )



Monazite ( $\text{Ce,La,Nd,Th}\text{PO}_4$ )

*Source: Mindat.org*

**Property:**  
Fluorescence (blue colour  
exposed to ultraviolet light)

## LANTHANUM ( $^{138}_{57}\text{La}$ )



Bastnäsite-(La) ( $((\text{La,Ce})\text{CO}_3\text{F})$ )

*Source: Mindat.org*

**Property:**  
 $\text{La}_2\text{O}_3$  improves glass alkali  
resistance, high refraction  
index and low dispersion



Automobile emissions  
control system



Fertilizers



Anti-counterfeiting  
phosphors in a 50€  
banknote



Telescope lenses



## SAMARIUM ( $^{150}_{62}\text{Sm}$ )



Smarskite-(Y)  
 $((\text{YFe}^{3+}\text{Fe}^{2+}\text{U,Th,Ca})_2(\text{Nb,Ta})_2\text{O}_8)$   
Source: Colecciones del Museo Histórico Minero D. Felipe de Borbón y Grecia. ETSIME-UPM.

### Property:

Radioactive Sm-153 is  $\beta$ -emitter with half-life of 46.3 hours (injected intravenously).

## SILICON METAL ( $^{28}_{14}\text{Si}$ )



Quartz ( $\text{SiO}_2$ )  
Source: Colecciones del Museo Histórico Minero D. Felipe de Borbón y Grecia. ETSIME-UPM.

### Property:

Crystalline silicon is a semiconductor material which converts light into electricity.

## ALUMINIUM ( $^{26}_{13}\text{Al}$ )



Bauxite ( $\text{AlO}_x(\text{OH})_{3-2x}$ )  $x \in [0,1]$   
Source: Colecciones del Museo Histórico Minero D. Felipe de Borbón y Grecia. ETSIME-UPM.

### Property:

Calcined alumina is a very hard material.

UPS! You **lose your turn.**  
If you have found two matching cards in this turn you cannot keep them,  
Sorry...



Used in treatment of cancer (lung cancer, prostate cancer, breast cancer)



Solar panels



Abrasives



UPS! You **lose your turn.**  
If you have found two matching cards in this turn you cannot keep them,  
Sorry...

Turn over 1 **secret extra card** but do not show it to the rest of the players. If that card matches the other one, you can keep it, if not put it back face down again, not letting anyone knowing which card it is.

Roll the dice to see how many **extra cards** you can turn over:

nº 1: 1 card from the group of your choice.

nº 2: 2 cards, 1 from the blue group and 1 from the orange.

nº 3: 3 cards, 2 from the blue group and 1 from the orange.

nº 4: 1 card from the group of your choice.

nº 5: 2 cards, 1 from the blue group and 1 from the orange.

nº 6: 3 cards, 1 from the blue group and 2 from the orange.

Roll the dice to see how many **extra cards** you can turn over:

nº 1: 1 card from the group of your choice.

nº 2: 2 cards, 1 from the blue group and 1 from the orange.

nº 3: 3 cards, 2 from the blue group and 1 from the orange.

nº 4: 1 card from the group of your choice.

nº 5: 2 cards, 1 from the blue group and 1 from the orange.

nº 6: 3 cards, 1 from the blue group and 2 from the orange.

**Steal a pair of cards** from the team of your choice.

You have 1 **extra turn.**

Raise one more card from the same group this turn.

Then you have a new chance.

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Raise one more card from the same group this turn.

Then you have a new chance.