

HOW TO ESCAPE

Pick your level, then work every part of a door to build its code. Type it into the terminal to open the door and reveal a key digit. Combine the key digits into the master override and escape.

SAFE MODE Set B · 5 doors · Support systems online.

DOOR 1 PARTICLE THEORY

CENSUS

These elements were logged. Work through them one at a time.

N

Cu

Hg

Ne

Fe

O

K

Br

How many are **liquid at 25 °C**?

How many are **gases at 25 °C**?

Code = the counts in that order. Careful: a solid can still be diatomic, and not every gas is diatomic.

DOOR CODE KEY DIGIT

DOOR 2 BONDING

STRUCTURE + CHARGES

Part 1. Work out the structure of each substance from its properties.

ionic = 1 · simple molecular = 2 · giant covalent = 3 · metallic = 4

Sub.	m.p. / °C	Conducts (solid)	Conducts (molten)	In water	Other	Type
W	1400	no	yes	dissolves	hard crystals	
X	-95	no	no	insoluble	gas at room temp	
Z	660	yes	yes	insoluble	shiny metal	

Door code = the structure types, read in order.

DOOR CODE KEY DIGIT

DOOR 3 REACTIVITY SERIES

DEDUCTION

Part 1. The metal samples, each with an **ID number**, were added to solutions of the others' sulfates (the columns). ✓ = a reaction, X = none, · = not tested. The ID numbers are only labels.

ID ↓	2	6	9
2	—	X	✓
6	✓	—	✓
9	X	X	—

Put the ID numbers in order from **most** to **least** reactive – that sequence is the code.

Door code = the ID numbers, most to least reactive.

DOOR CODE KEY DIGIT

DOOR 4 RUSTING

RANKING

Every tube holds an identical iron nail. **Rank only the tubes that rust**, fastest first, and read their numbers in that order. Leave out any that will not rust at all.

TUBE 7

strong salt water, open to the air

rank

TUBE 3

weak salt water, open to the air

rank

TUBE 1

plain water, open to the air

rank

TUBE 4

plain water with a drying agent, sealed

rank

Both water and oxygen are needed to rust; dissolved salt speeds it up. Watch for traps.

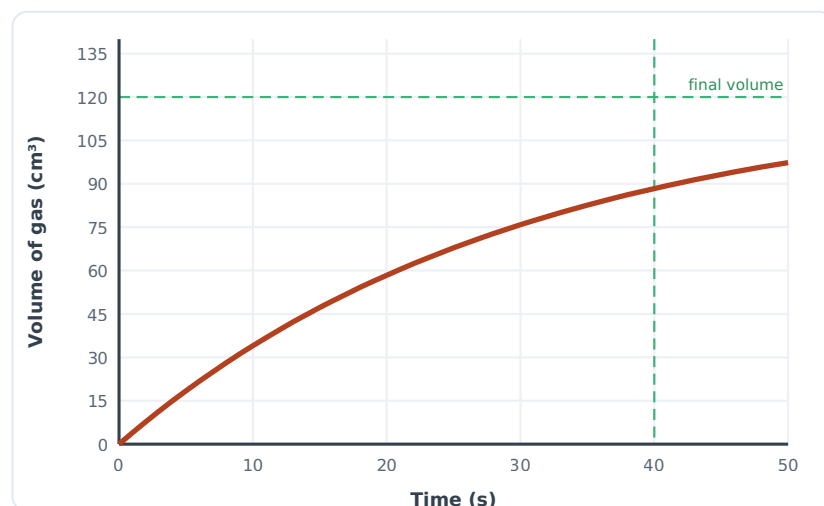
DOOR
CODE

KEY
DIGIT

DOOR 5 RATES OF REACTION

READ THE CURVE

The graph shows the gas given off as marble chips react with dilute acid.



1 Final (maximum) volume of gas, in cm^3

2 Average rate over the whole reaction, in cm^3/s

Door code = the answers in order. The green lines mark the final volume and the time the reaction finishes.

DOOR
CODE

KEY
DIGIT

Each clue gives only a **type** of element. Exactly one element of that type is hidden in the grid - **find it**, then write the **first letter** of each element. Enter them in order 1-4 for the code.

O	A	J	V	Q	S	B	G	E	D	R	R	X
Z	T	Z	F	Y	B	D	M	A	Z	A	S	I
Z	K	X	Q	Z	D	C	U	J	D	H	N	M
A	X	I	B	W	A	O	I	Q	I	E	S	R
N	L	V	O	V	K	A	S	X	X	Q	P	Y
B	R	O	M	I	N	E	S	Q	B	E	Y	Y
Z	T	N	B	C	P	W	A	Y	X	U	D	R
R	A	X	V	A	T	L	T	N	I	N	D	G
C	U	X	H	L	K	T	O	B	A	I	H	V
B	O	L	P	C	U	B	P	R	L	C	H	Q
O	W	C	K	I	J	N	U	W	P	K	L	U
G	M	W	Q	U	H	K	Y	S	W	E	K	N
I	B	I	I	M	X	J	D	G	K	L	N	G

1. A Group 1 metal
2. A Group 2 metal
3. A transition metal
4. A Group 7 element (a halogen)

CODE 1 2 3 4

The clue only tells you the group - the grid tells you which element it is.

MASTER OVERRIDE — SAFE MODE 

Write each key digit, then enter your key digits in order, into the terminal.

STANDARD Set B · 6 doors · Containment failing. Proceed with care.

🔒 DOOR 1 PARTICLE THEORY

CENSUS

These elements were logged. Work through them one at a time.

Br

Hg

H

O

Cu

Fe

Cl

Na

Ne

Ca

I

N

How many are **liquid at 25 °C**?

How many are **gases at 25 °C**?

How many are **diatomic molecules**?

Code = the counts in that order. Careful: a solid can still be diatomic, and not every gas is diatomic.

DOOR
CODE

KEY
DIGIT

🔒 DOOR 2 BONDING

STRUCTURE + CHARGES

Part 1. Work out the structure of each substance from its properties.

ionic = 1 · simple molecular = 2 · giant covalent = 3 · metallic = 4

Sub.	m.p. / °C	Conducts (solid)	Conducts (molten)	In water	Other	Type
Y	1610	no	no	insoluble	hard, glassy	
W	1465	no	yes	dissolves	white crystals	
Z	1538	yes	yes	insoluble	strong metal	

Part 2. Give the **charge** (just the number) on the ion of each of these. You are expected to know them.

Potassium

Oxide

Iron(III)

Bromide

Door code = the structure types, then the ion charges.

DOOR
CODE

KEY
DIGIT

DOOR 3 REACTIVITY SERIES

DEDUCTION

Part 1. The metal samples, each with an **ID number**, were added to solutions of the others' sulfates (the columns). ✓ = a reaction, X = none, · = not tested. The ID numbers are only labels.

ID ↓	1	5	6	8
1	—	X	·	X
5	✓	—	X	·
6	·	✓	—	✓
8	✓	·	X	—

Clue: in the same dilute acid, metal **8** fizzed harder than metal **5**.

Put the ID numbers in order from **most** to **least** reactive – that sequence is the code.

Part 2. Balance the reaction and read the coefficients left to right.



Door code = the reactivity IDs in order, then the coefficients.

DOOR
CODE

KEY
DIGIT

DOOR 4 RUSTING

RANKING

Every tube holds an identical iron nail. **Rank only the tubes that rust**, fastest first, and read their numbers in that order. Leave out any that will not rust at all.

TUBE 2

iron nail in 5% salt water, open to the air

rank

TUBE 6

iron nail in 3% salt water, open to the air

rank

TUBE 4

iron nail in 1% salt water, open to the air

rank

TUBE 8

iron nail in plain water, open to the air

rank

TUBE 5

iron nail in water, sealed under nitrogen gas

rank

TUBE 1

iron nail with a magnesium strip, in water, open to the air

rank

Both water and oxygen are needed to rust; dissolved salt speeds it up. Watch for traps.

DOOR
CODE

KEY
DIGIT

A single flask holds **sand, iron filings, copper(II) sulfate, water and ethanol**. Recover **every** substance, pure and separate.

Choose the techniques you need and put them in the **order you would use them**. Some are decoys. Read the numbers in your chosen order.

4 Using a magnet

6 Filtration

3 Fractional distillation

8 Crystallisation

1 Simple distillation

9 Chromatography

ORDER → →

Remove the magnetic solid first, then the insoluble one, before you split the liquids. Ethanol and water need fractional distillation.

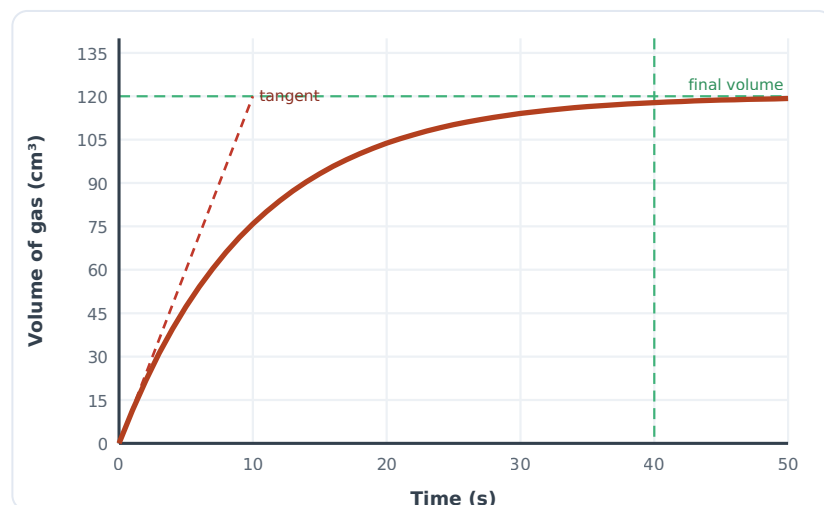
DOOR
CODE

KEY
DIGIT

DOOR 6 RATES OF REACTION

READ THE CURVE

The graph shows the gas given off as marble chips react with dilute acid.



1 Initial rate: gradient of the tangent at $t = 0$, in cm^3/s

2 Average rate over the whole reaction, in cm^3/s

3 The run is repeated with **half** the concentration: the initial rate now, in cm^3/s

Door code = the answers in order. The green lines mark the final volume and the time the reaction finishes. Read the tangent's gradient from two points on it.

DOOR
CODE

KEY
DIGIT

Each clue gives only a **type** of element. Exactly one element of that type is hidden in the grid - **find it**, then write the **chemical symbol** of each element (find iron → write **Fe**). Enter them in order 1-4 for the code.

F	M	P	Y	H	V	H	U	L	C	S	M	U
K	B	T	T	F	B	W	T	X	A	M	U	Y
R	Q	C	Y	Y	L	E	K	N	A	P	I	L
A	B	A	V	U	N	U	E	E	V	D	C	S
D	W	G	M	I	K	W	Q	A	B	L	L	N
C	F	N	M	U	T	U	J	G	G	W	A	K
N	G	O	G	B	I	S	P	K	F	R	C	R
K	R	Z	Q	O	T	S	T	H	E	Y	Y	N
B	A	Z	E	R	D	I	S	P	S	U	M	G
M	Q	N	M	Z	A	T	P	A	D	L	U	I
V	C	T	J	D	Q	O	F	L	T	G	U	D
I	O	X	H	A	C	Q	X	K	D	O	H	Y
U	W	Y	G	I	W	P	X	K	N	Y	P	A

1. A Group 1 metal
2. A Group 2 metal
3. A transition metal
4. A Group 7 element (a halogen)

CODE

The clue only tells you the group - the grid tells you which element it is.

MASTER OVERRIDE — STANDARD



Write each key digit, then enter your key digits in order, into the terminal.

DOOR 1 PARTICLE THEORY

CENSUS

These elements were logged. Work through them one at a time.

Br	Hg	I	H	N	O	Cl	Ne	Ar	Kr
Fe	C	P	K						

How many are **liquid at 25 °C**?

How many are **both a gas and diatomic**?

How many are **diatomic but not a gas**?

Code = the counts in that order. Careful: a solid can still be diatomic, and not every gas is diatomic.

DOOR
CODE

KEY
DIGIT

DOOR 2 BONDING

STRUCTURE + CHARGES

Part 1. Work out the structure of each substance from its properties.

ionic = 1 · simple molecular = 2 · giant covalent = 3 · metallic = 4

Sub.	m.p. / °C	Conducts (solid)	Conducts (molten)	In water	Other	Type
V	1710	no	no	insoluble	giant, glassy, hard	
W	770	no	yes	dissolves	crystalline salt	
X	-182	no	no	insoluble	colourless gas	
Z	1064	yes	yes	insoluble	soft, shiny metal	

Part 2. Give the **charge** (just the number) on the ion of each of these. You are expected to know them.

Astatide

Lead(II)

Iron(III)

Copper(I)

Door code = the structure types, then the ion charges.

DOOR
CODE

KEY
DIGIT

DOOR 3 REACTIVITY SERIES

DEDUCTION

Part 1. The metal samples, each with an **ID number**, were added to solutions of the others' sulfates (the columns). ✓ = a reaction, X = none, · = not tested. The ID numbers are only labels.

ID ↓	1	2	5	7	8
1	—	X	X	X	X
2	✓	—	X	X	X
5	✓	✓	—	·	X
7	✓	✓	·	—	X
8	✓	✓	✓	✓	—

Clue: in the same dilute acid, metal **5** fizzed harder than metal **7**.

Put the ID numbers in order from **most** to **least** reactive – that sequence is the code.

Part 2. Balance the reaction and read the coefficients left to right.



Door code = the reactivity IDs in order, then the coefficients.

DOOR
CODE

KEY
DIGIT

DOOR 4 RUSTING

RANKING

Every tube holds an identical iron nail. **Rank only the tubes that rust**, fastest first, and read their numbers in that order. Leave out any that will not rust at all.

TUBE 6

iron nail in salty water, open to the air

rank

TUBE 2

iron nail in rainwater, open to the air

rank

TUBE 7

iron nail in plain water, open to the air

rank

TUBE 4

iron nail in plain water, only half filled (little air)

rank

TUBE 1

iron nail in water, sealed under oil

rank

TUBE 3

tin-plated nail, coating intact, in salty water

rank

TUBE 5

iron nail in water with a drying agent, sealed

rank

Both water and oxygen are needed to rust; dissolved salt speeds it up. Watch for traps.

DOOR
CODE

KEY
DIGIT

A single flask holds **sand, iron filings, salt, water and propanol**. Recover **every** substance, pure and separate.

Choose the techniques you need and put them in the **order you would use them**. Some are decoys. Read the numbers in your chosen order.

2 Using a magnet

9 Filtration

6 Fractional distillation

4 Crystallisation

7 Simple distillation

1 Decanting

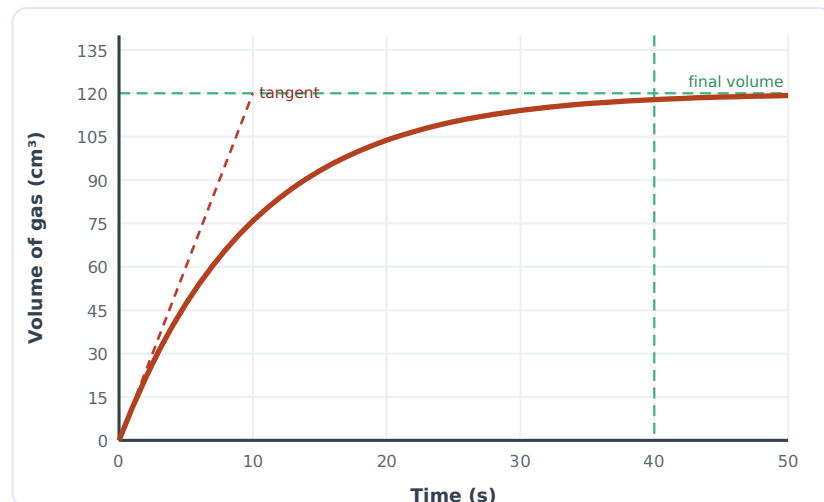
ORDER → →

Magnet first for the iron, then filter out the sand, then fractional distillation for the miscible liquids. Salt is left behind, dry.

DOOR
CODE

KEY
DIGIT

The graph shows the gas given off as marble chips react with dilute acid.



1 Initial rate: gradient of the tangent at $t = 0$, in cm^3/s

2 Average rate over the whole reaction, in cm^3/s

3 The run is repeated with **half** the concentration: the initial rate now, in cm^3/s

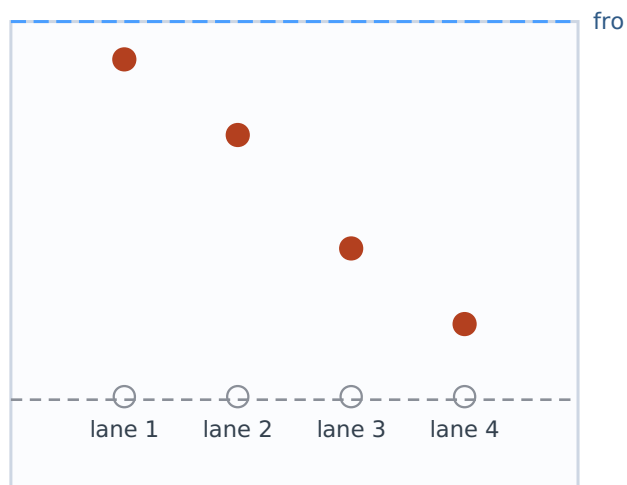
4 With half the concentration (acid limiting): the final volume now, in cm^3

Door code = the answers in order. The green lines mark the final volume and the time the reaction finishes. Read the tangent's gradient from two points on it.

DOOR
CODE

KEY
DIGIT

A chromatogram of the dyes is shown, **printed to scale**. The dashed lines are the baseline (bottom) and the solvent front (top).



$$R_f = \text{distance the dye rose} \div \text{distance the solvent rose}$$

Measure with a ruler. For each lane, measure how far the spot rose from the baseline and how far the solvent front rose, work out R_f , then **$\times 10$ and round to the nearest whole number**. Read the numbers from lane 1 to lane 4.

LANE 1

LANE 2

LANE 3

LANE 4

Round to a whole number so a millimetre out either way will not matter. Measure to the middle of each spot.

DOOR
CODE

KEY
DIGIT

BONUS OVERRIDE VAULT

WORD SEARCH

Each clue gives only a **type** of element. Exactly one element of that type is hidden in the grid - **find it**, then write the **chemical symbol** of each element (find iron → write **Fe**). Enter them in order 1–4 for the code.

Z	C	T	U	S	I	I	K	X	N	Y	M	C
D	H	X	X	Y	P	Q	X	U	O	C	O	G
T	L	O	H	N	S	V	X	J	O	P	G	N
B	O	A	T	S	X	U	V	M	P	A	Z	Q
U	R	M	O	T	Z	L	P	E	D	Y	F	H
O	I	U	J	R	Y	J	R	B	U	B	B	I
W	N	I	X	T	E	V	T	S	E	J	G	P
C	E	C	U	M	E	T	V	P	F	U	X	O
G	I	L	K	U	U	F	Y	P	T	Z	J	X
R	Y	A	G	I	I	X	S	G	I	N	Z	H
S	F	C	L	D	V	L	G	E	C	S	N	K
V	F	E	N	O	X	S	H	W	B	R	F	H
E	I	T	T	S	Y	A	E	P	A	A	Z	I

1. An alkali metal
2. An alkaline earth metal
3. A transition metal
4. A halogen

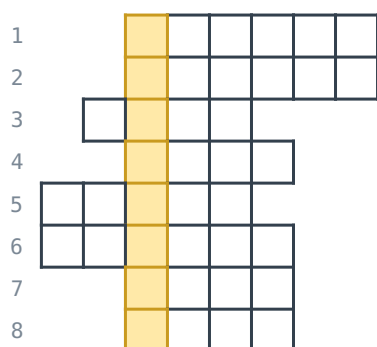
CODE

The clue only tells you the group - the grid tells you which element it is.

BONUS II OVERRIDE VAULT

CROSSWORD

Solve the clues and write one letter per box. The **shaded column**, read from top to bottom, spells the vault password.



1. Element found in every organic compound (6)
2. A soluble base (6)
3. The smallest particle of an element (4)
4. pH below 7; turns litmus red (4)
5. A mixture of metals, such as brass (5)
6. Gas needed for both rusting and burning (6)
7. Formed when an acid neutralises a base (4)
8. A limewater ___ detects carbon dioxide (4)

Every answer crosses the shaded column at one letter.

DOOR CODE

MASTER OVERRIDE — MELTDOWN



Write each key digit, then enter your key digits **REVERSED** (last door first), into the terminal.