

Worksheet 12.2 The periodic table (transition metals)
I MCQs

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

1 Some properties of substances are listed.

- 1 They conduct electricity.
- 2 They have low densities.
- 3 They have high melting points.
- 4 They are malleable.

Which properties are shown by transition metals?

A 1 and 3 only **B** 1 and 4 only **C** 1, 2 and 3 **D** 1, 3 and 4

2 The properties of the element titanium, Ti, can be predicted from its position in the Periodic Table.

Which row identifies the properties of titanium?

	can be used as a catalyst	conducts electricity when solid	has low density	forms coloured compounds
A	✓	✓	✓	x
B	✓	✓	x	✓
C	✓	x	✓	✓
D	x	✓	✓	✓

3 Transition elements can have variable oxidation states.

Which pair of compounds shows a transition element in two different oxidation states?

- A** Cr_2O_3 and $\text{Cr}_2(\text{SO}_4)_3$
- B** Cu_2O and CuCO_3
- C** ZnS and ZnSO_4
- D** NiO and $\text{Ni}(\text{NO}_3)_2$

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4 Which row describes a transition element?

	density in g/cm ³	colour of chloride
A	0.98	green
B	0.98	white
C	8.90	green
D	8.90	white

5 Which pair of compounds shows that transition elements have variable oxidation states?

- A** Cr₂O₃ and CrBr₃
- B** CuSO₄ and CuCl₂
- C** Fe₂O₃ and FeCl₂
- D** NiO and NiCl₂

6 Iron(II) ions can be oxidised to iron(III) ions by hydrogen peroxide.

Which statement explains why iron is a transition element?

- A** Iron is a transition element because it can be oxidised.
- B** Iron is a transition element because it has variable oxidation states.
- C** Iron is a transition element because it takes part in redox reactions.
- D** Iron is a transition element because it reacts with chlorine.

7 Iron reacts with dilute hydrochloric acid to form iron(II) chloride, FeCl₂. Iron reacts with chlorine to form iron(III) chloride, FeCl₃.

Which property of transition elements is shown by this information?

- A** Transition elements have high melting points.
- B** Transition elements can act as catalysts.
- C** Transition elements have variable oxidation states.
- D** Transition elements have coloured compounds.

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8

Which elements in the table are transition elements?

element	property
E	forms E^{3+} ions only
F	forms F^+ and F^{2+} ions
G	forms only white salts
H	used in catalytic converters

A E and G

B E and H

C F and G

D F and H

9

Which row describes the properties of a typical transition element?

	melting point	variable oxidation number	can act as a catalyst
A	high	no	no
B	high	yes	yes
C	low	no	yes
D	low	yes	no

1

An element melts at 1455°C , has a density of 8.90 g/cm^3 and forms a green chloride.

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Where in the Periodic Table is this element found?

A 10x10 grid representing a periodic table. The grid is divided into four regions by a horizontal line between the second and third rows and a vertical line between the third and sixth columns. The regions are labeled as follows:

- Region A:** The top-right region, consisting of the top two rows of the last two columns (columns 9 and 10, rows 1 and 2).
- Region B:** The top-left region, consisting of the top two rows of the first two columns (columns 1 and 2, rows 1 and 2).
- Region C:** The middle region, consisting of the third row of columns 3 through 6, and the fourth row of columns 3 through 5.
- Region D:** The bottom-right region, consisting of the bottom two rows of the last two columns (columns 9 and 10, rows 8 and 9).

The grid is empty except for these labels.

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11

2

substance	melting point /°C	boiling point /°C	solubility in water	electrical conductivity when molten	electrical conductivity when solid
F	−97	65	very soluble	does not conduct	does not conduct
G	1600	2230	insoluble	does not conduct	does not conduct
H	801	1413	soluble	conducts	does not conduct
I	−57	126	insoluble	does not conduct	does not conduct
J	1085	2562	insoluble	conducts	conducts

- (a) Which substance in the table has ionic bonding?
..... [1]
- (b) Which substance in the table has a giant covalent structure?
..... [1]
- (c) Name a method you could use to separate a mixture of substance **J** and water.
..... [1]
- (d) Name a method you could use to obtain substance **F** from a mixture of substance **F** and water.
..... [2]
- (e) Describe how you could obtain a solid sample of substance **H** from a mixture of substance **H** and substance **G**.
.....
.....
.....
.....
.....
..... [3]
- (f) Substance **J** is a metal.
Describe how substance **J** is able to conduct electricity when it is a solid.
.....
.....
..... [2]

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