



A-Level Chemistry

Redox

(Multiple Choice)

Question Paper

Time available: 32 minutes

Marks available: 30 marks

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1.

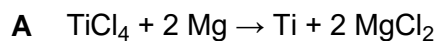
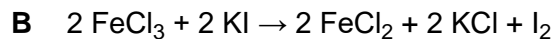
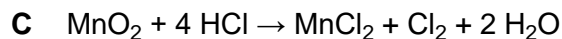
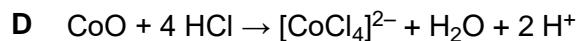
Which compound contains a chlorine atom with an oxidation state of +4?

☐☐☐☐

(Total 1 mark)

2.

Which equation does **not** show the reduction of a transition metal?

☐☐☐☐

(Total 1 mark)

3.

NO_2^- ions can be reduced in acidic solution to NO. How many electrons are gained when each NO_2^- ion is reduced?

A 1

☐

B 2

☐

C 3

☐

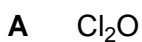
D 4

☐

(Total 1 mark)

4.

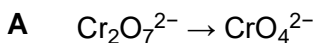
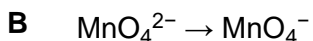
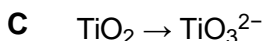
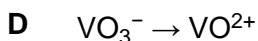
Which compound contains chlorine in an oxidation state of +1?

☐☐☐☐

(Total 1 mark)

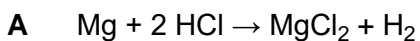
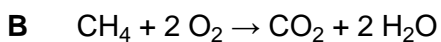
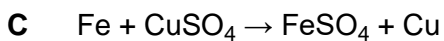
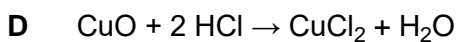
5.

In which conversion is the metal reduced?

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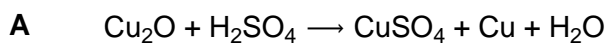
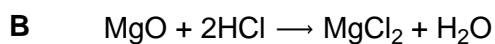
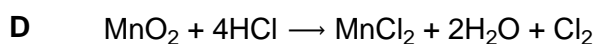
(Total 1 mark)

6.

Which equation does **not** represent a redox reaction?☐☐☐☐

(Total 1 mark)

7.

Which of these is **not** a redox reaction?☐☐☐☐

(Total 1 mark)

8.

Which species is **not** produced by a redox reaction between solid sodium iodide and concentrated sulfuric acid?

A Na_2SO_4 ☐

B H_2S ☐

C S ☐

D SO_2 ☐

(Total 1 mark)

9.

V_2O_5 can be used as a catalyst in the Contact Process.

Which is a step in the Contact Process in which the vanadium is oxidised?

A $\text{SO}_2 + \text{V}_2\text{O}_5 \rightarrow \text{SO}_3 + 2\text{VO}_2$ ☐

B $\text{SO}_3 + 2\text{VO}_2 \rightarrow \text{SO}_2 + \text{V}_2\text{O}_5$ ☐

C $2\text{VO}_2 + \frac{1}{2}\text{O}_2 \rightarrow \text{V}_2\text{O}_5$ ☐

D $\text{V}_2\text{O}_5 \rightarrow 2\text{VO}_2 + \frac{1}{2}\text{O}_2$ ☐

(Total 1 mark)

10.

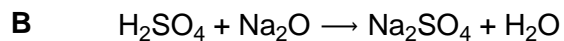
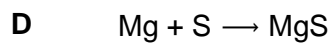
Which of these shows nitrogen in its correct oxidation states in the compounds given?

	NH_3	N_2O	HNO_2	
A	+3	-1	+5	<input type="checkbox"/>
B	-3	+1	+3	<input type="checkbox"/>
C	-3	+1	-5	<input type="checkbox"/>
D	+3	-1	-3	<input type="checkbox"/>

(Total 1 mark)

11.

Which of these is a redox reaction?

☐☐☐☐**(Total 1 mark)****12.**

Which of these species is the best reducing agent?

☐☐☐☐**(Total 1 mark)****13.**

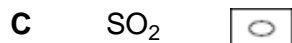
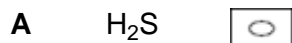
Which of the following shows chlorine in its correct oxidation states in the compounds shown?

	HCl	KClO ₃	HClO	
A	-1	+3	+1	<input type="radio"/>
B	+1	-5	-1	<input type="radio"/>
C	-1	+5	+1	<input type="radio"/>
D	+1	+5	-1	<input type="radio"/>

(Total 1 mark)

14.

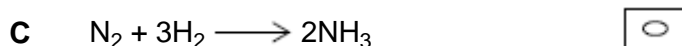
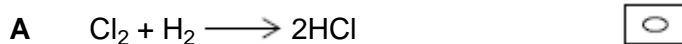
Which substance is **not** produced in a redox reaction when solid sodium iodide reacts with concentrated sulfuric acid?



(Total 1 mark)

15.

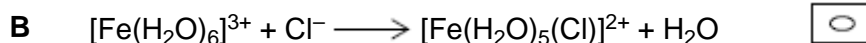
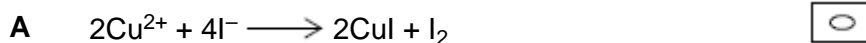
In which reaction is hydrogen acting as an oxidising agent?



(Total 1 mark)

16.

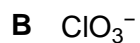
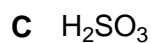
In which reaction is the metal oxidised?



(Total 1 mark)

17.

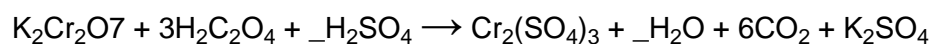
Which species contains an element with an oxidation state of +4?

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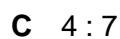
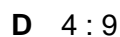
(Total 1 mark)

18.

Refer to the unbalanced equation below when answering this question.



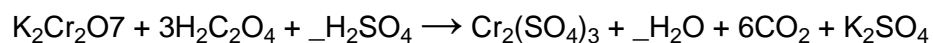
In the balanced equation the mole ratio for sulfuric acid to water is

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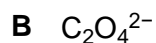
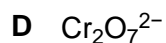
(Total 1 mark)

19.

Refer to the unbalanced equation below when answering this question.



What is the reducing agent in this reaction?

☐☐☐☐

(Total 1 mark)

20.

Which one of the following is the electron arrangement of the strongest reducing agent?

- A $1s^2 2s^2 2p^5$
- B $1s^2 2s^2 2p^6 3s^2$
- C $1s^2 2s^2 2p^6 3s^2 3p^5$
- D $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

(Total 1 mark)

21.

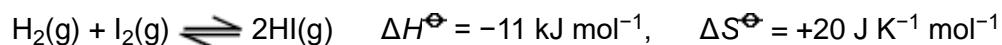
Which one of the following is **not** a redox reaction?

- A $\text{Br}_2 + \text{SO}_2 + 2\text{H}_2\text{O} \rightarrow \text{SO}_4^{2-} + 4\text{H}^+ + 2\text{Br}^-$
- B $\text{SnCl}_2 + \text{HgCl}_2 \rightarrow \text{Hg} + \text{SnCl}_4$
- C $\text{Cu}_2\text{O} + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{Cu} + \text{H}_2\text{O}$
- D $2\text{CrO}_4^{2-} + 2\text{H}^+ \rightarrow \text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O}$

(Total 1 mark)

22.

Refer to the following reaction



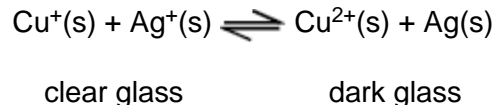
Which one of the following statements is correct?

- A This is a redox reaction.
- B The reaction is **not** feasible below 298 K
- C At equilibrium, the yield of hydrogen iodide is changed by increasing the pressure.
- D At equilibrium, the yield of hydrogen iodide increases as the temperature is increased.

(Total 1 mark)

23.

Photochromic glass contains silver ions and copper ions. A simplified version of a redox equilibrium is shown below. In bright sunlight the high energy u.v. light causes silver atoms to form and the glass darkens. When the intensity of the light is reduced the reaction is reversed and the glass lightens.



When the photochromic glass darkens

- A the Ag^+ ion is acting as an electron donor.
- B the Cu^+ ion is acting as a reducing agent.
- C the Ag^+ ion is oxidised.
- D the Cu^+ ion is reduced.

(Total 1 mark)

24.

Which one of the following statements is **not** correct?

- A The first ionisation energy of iron is greater than its second ionisation energy.
- B The magnitude of the lattice enthalpy of magnesium oxide is greater than that of barium oxide.
- C The oxidation state of iron in $[\text{Fe}(\text{CN})_6]^{3-}$ is greater than the oxidation state of copper in $[\text{CuCl}_2]^-$
- D The boiling point of C_3H_8 is lower than that of $\text{CH}_3\text{CH}_2\text{OH}$

(Total 1 mark)

25.

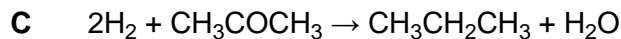
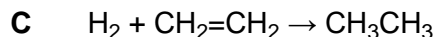
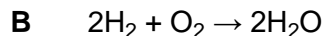
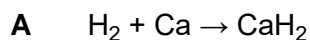
The vanadium does **not** have an oxidation state of +3 in

- A $[\text{V}(\text{H}_2\text{O})_6]^{3+}$
- B $[\text{V}(\text{C}_2\text{O}_4)_3]^{3-}$
- C $[\text{V}(\text{OH})_3(\text{H}_2\text{O})_3]$
- D $[\text{VCl}_4]^{3-}$

(Total 1 mark)

26.

In which one of the following reactions does hydrogen **not** act as a reducing agent?



(Total 1 mark)

27.

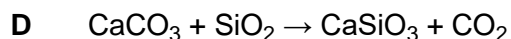
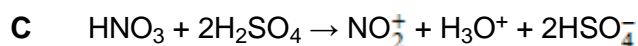
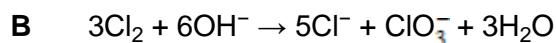
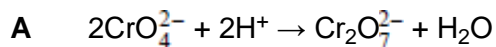
In which one of the following reactions is the role of the reagent stated correctly?

	Reaction	Role of reagent
A	$\text{TiO}_2 + 2\text{C} + 2\text{Cl}_2 \rightarrow \text{TiCl}_4 + 2\text{CO}$	TiO_2 is an oxidising agent
B	$\text{HNO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{H}_2\text{NO}_3^+ + \text{HSO}_4^-$	HNO_3 is a Brønsted-Lowry acid
C	$\text{CH}_3\text{COCl} + \text{AlCl}_3 \rightarrow \text{CH}_3\text{CO}^+ + \text{AlCl}_4^-$	AlCl_3 is a Lewis base
D	$2\text{CO} + 2\text{NO} \rightarrow 2\text{CO}_2 + \text{N}_2$	CO is a reducing agent

(Total 1 mark)

28.

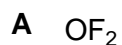
Which one of the following is a redox reaction?

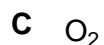
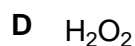


(Total 1 mark)

29.

In which of these substances is oxygen in the highest oxidation state?

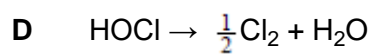
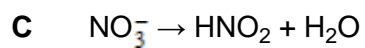
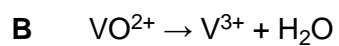
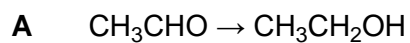

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(Total 1 mark)

30.

In which one of the following reactions do two H ions and one electron have to be added to the left-hand side in order to balance the equation?



(Total 1 mark)