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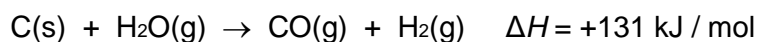
Multiple-Choice Questions on Redox

- Which method of preparation of magnesium sulfate is an example of a redox reaction?
A $\text{Mg} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2$
B $\text{MgO} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2\text{O}$
C $\text{Mg}(\text{OH})_2 + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + 2\text{H}_2\text{O}$
D $\text{MgCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2\text{O} + \text{CO}_2$
- Which statement describes the conversion of zinc atoms to zinc ions?
A The change is reduction, because there has been a gain of electrons.
B The change is oxidation, because there has been a loss of electrons.
C The change is reduction, because there has been a loss of electrons.
D The change is oxidation, because there has been a gain of electrons.
- In which reaction is nitric acid acting as an oxidising agent?
A $\text{Cu} + 4\text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{H}_2\text{O} + 2\text{NO}_2$
B $\text{CuO} + 2\text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{H}_2\text{O}$
C $\text{Na}_2\text{CO}_3 + 2\text{HNO}_3 \rightarrow 2\text{NaNO}_3 + \text{H}_2\text{O} + \text{CO}_2$
D $\text{NaOH} + \text{HNO}_3 \rightarrow \text{NaNO}_3 + \text{H}_2\text{O}$
- Which reaction is **not** a redox reaction?
A $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
B $2\text{C} + \text{O}_2 \rightarrow 2\text{CO}$
C $\text{C} + \text{CO}_2 \rightarrow 2\text{CO}$
D $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$
- Many reactions involve oxidation and reduction.
Which statement is correct?
A Acidified manganate(VII) ions change colour from colourless to purple when reduced.
B All reactions that involve oxidation also involve reduction.
C During a reaction, oxidising agents lose electrons.
D Reduction is the loss of hydrogen from a compound.

6. In which reaction is the underlined substance reduced?

- A C(s) + CO₂(g) → 2CO(g)
 B Cl₂(g) + 2I⁻(aq) → I₂(aq) + 2Cl⁻(aq)
 C Mg(s) + CuO(s) → MgO(s) + Cu(s)
 D Zn(s) + 2H⁺(aq) → Zn²⁺(aq) + H₂(g)

7. The equation for an industrial process is shown.



Which row is correct?

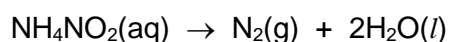
	the oxidising agent is	the reducing agent is	the reaction is
A	C(s)	H ₂ O(g)	endothermic
B	C(s)	H ₂ O(g)	exothermic
C	H ₂ O(g)	C(s)	endothermic
D	H ₂ O(g)	C(s)	exothermic

8. Which statements about oxidation and reduction are correct?

- 1 Reduction can involve the loss of oxygen.
- 2 Oxidation can involve the loss of hydrogen.
- 3 Reduction can involve the loss of electrons.

- A 1 and 2 only B 1 and 3 only
 C 2 and 3 only D 1, 2 and 3

9. Aqueous ammonium nitrite, NH₄NO₂, decomposes when heated.



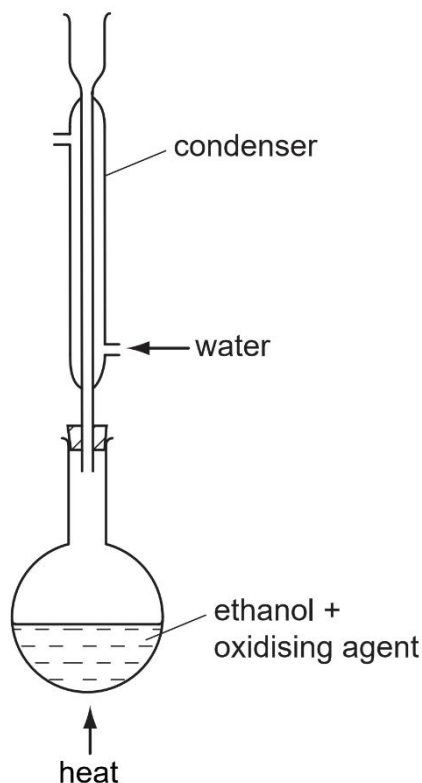
In this salt, the anion is ...1... .

The nitrogen atoms in the ...2... ion are oxidised during the reaction.

Which formulae correctly complete gaps 1 and 2?

	1	2
A	NH ₄ ⁺	NH ₄ ⁺
B	NH ₄ ⁺	NO ₂ ⁻
C	NO ₂ ⁻	NH ₄ ⁺
D	NO ₂ ⁻	NO ₂ ⁻

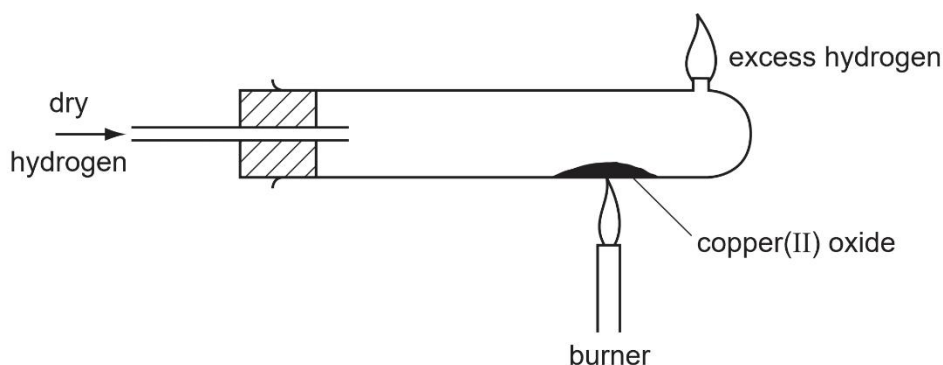
10. The oxidation of ethanol to ethanoic acid is often carried out in the apparatus shown.



What is the purpose of the condenser?

- A To prevent air reacting with the ethanoic acid.
- B To prevent any ethanol from escaping.
- C To prevent the ethanoic acid changing back to ethanol.
- D To prevent the ethanoic acid reacting with the ethanol.

11. The diagram shows copper(II) oxide being reduced, by hydrogen, to copper. After reduction is complete, the burner is turned off but the flow of hydrogen is continued until the tube is cool.



Why is the hydrogen allowed to flow through the tube during cooling?

- A To allow the tube to cool slowly.
- B To lessen the risk of explosion in the hot tube.
- C To prevent the copper from reacting with the air.
- D To remove any traces of water left in the tube.

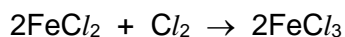
12. Which one is **not** an example of oxidation?

- A Converting iron(III) salts into iron(II) salts.
- B Converting magnesium atoms into magnesium ions.
- C Dissolving of a copper anode during electrolysis.
- D Liberating chlorine from a chloride.

13. Which reaction does **not** involve either oxidation or reduction?

- A $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$
- B $\text{Cu}^{2+}(\text{aq}) + \text{Zn}(\text{s}) \rightarrow \text{Cu}(\text{s}) + \text{Zn}^{2+}(\text{aq})$
- C $\text{CuO}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{CuSO}_4(\text{aq}) + \text{H}_2\text{O}(\text{l})$
- D $\text{Zn}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{ZnSO}_4(\text{aq}) + \text{H}_2(\text{g})$

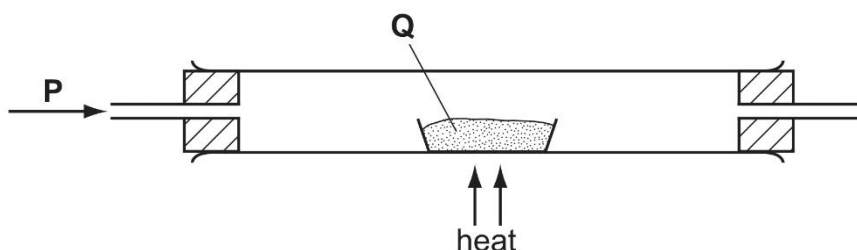
14. The equation shows what happens in a redox reaction between iron(II) chloride and chlorine gas.



Which equation describes the reduction process in this reaction?

- A $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$
- B $\text{Cl}_2 + 2\text{e}^- \rightarrow 2\text{Cl}^-$
- C $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + \text{e}^-$
- D $\text{Fe}^{3+} + \text{e}^- \rightarrow \text{Fe}^{2+}$

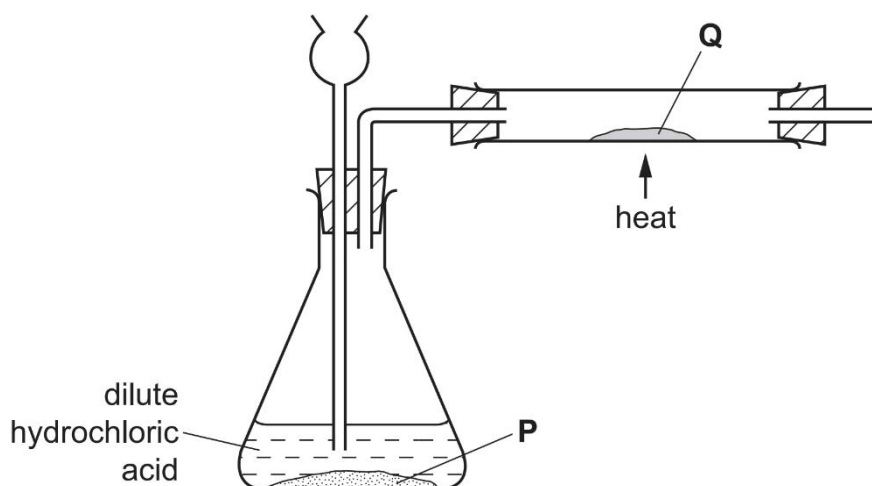
15. In the apparatus shown, gas **P** is passed over solid **Q**.



No reaction occurs if **P** and **Q** are:

	P	Q
A	hydrogen	lead(II) oxide
B	hydrogen	magnesium oxide
C	oxygen	carbon
D	oxygen	sulfur

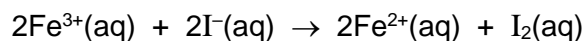
16. Substance **P** reacts with dilute hydrochloric acid to produce a gas.
This gas reduces substance **Q**.



What are substances **P** and **Q**?

	P	Q
A	copper	copper(II) oxide
B	lead	lead(II) oxide
C	magnesium	zinc oxide
D	zinc	copper(II) oxide

17. The ionic equation shows the reaction between potassium iodide and iron(III) chloride.



Which terms describe the changes to the iron(III) ions and iodide ions?

	iron(III) ions	iodide ions
A	oxidised	reduced
B	oxidised	oxidised
C	reduced	oxidised
D	reduced	reduced


18. Which oxide is most readily reduced to the metal by heating in a stream of hydrogen?

- A** Calcium oxide **B** Lead(II) oxide
C Sodium oxide **D** Zinc oxide

19. Which gas could be used to reduce copper(II) oxide to copper?

- A** Carbon dioxide **B** Hydrogen
C Nitrogen **D** Oxygen

20. The metals iron, lead and zinc can be manufactured by the reduction of their oxides with coke. What is the correct order of the ease of reduction of the metal oxides?

	oxide becomes more difficult to reduce <div style="text-align: center;">  </div>
A	iron → lead → zinc
B	iron → zinc → lead
C	lead → iron → zinc
D	zinc → iron → lead

21. Iron is extracted from its ore haematite, Fe_2O_3 , by a reduction process in the blast furnace. Which equation for reactions in the blast furnace shows the formation of the reducing agent?

- A $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
 B $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3$
 C $\text{CO}_2 + \text{C} \rightarrow 2\text{CO}$
 D $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$

22. The reaction between zinc and aqueous copper(II) sulfate is a redox reaction. What is the **ionic** equation for this redox reaction?

- A $\text{Zn}^{2+}(\text{aq}) + \text{Cu}(\text{s}) \rightarrow \text{Zn}(\text{s}) + \text{Cu}^{2+}(\text{aq})$
 B $\text{Zn}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{ZnSO}_4(\text{aq})$
 C $\text{Zn}(\text{s}) + \text{CuSO}_4(\text{aq}) \rightarrow \text{ZnSO}_4(\text{aq}) + \text{Cu}(\text{s})$
 D $\text{Zn}(\text{s}) + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{Cu}(\text{s})$

23. In which equation is the underlined element reduced?

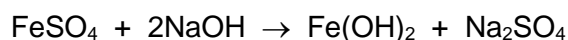
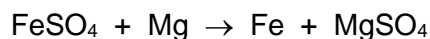
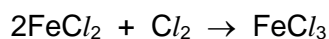
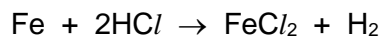
- A Cu $\text{SO}_4(\text{aq}) + \text{Mg}(\text{s}) \rightarrow \text{Cu}(\text{s}) + \text{MgSO}_4(\text{aq})$
 B 2Fe $\text{Cl}_2(\text{s}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{FeCl}_3(\text{s})$
 C 2S $\text{O}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{SO}_3(\text{g})$
 D Zn $(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{ZnSO}_4(\text{aq}) + \text{H}_2(\text{g})$

24. Which pair of metals are **not** oxidised when added to water?

- 1 calcium
 2 copper
 3 potassium
 4 silver

- A 1 and 2 B 1 and 3 C 2 and 4 D 3 and 4

25. Equations for the reactions of iron and compounds of iron are shown.



How many of these are redox reactions?

- A 1 B 2 C 3 D 4

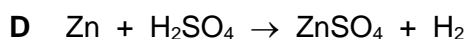
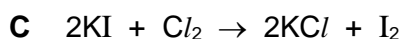
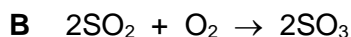
26. Aqueous potassium iodide, KI(aq), can be used as a test reagent in redox reactions.

Iodide ions are readilyX..... . A positive result for the test is when the solution changes colour fromY..... toZ..... .

Which words correctly complete gaps X, Y and Z?

	X	Y	Z
A	oxidised	brown	colourless
B	oxidised	colourless	brown
C	reduced	brown	colourless
D	reduced	colourless	brown

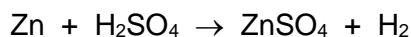
27. Which equation does **not** represent a redox reaction?



28. Which metal oxide will be reduced by heating with iron?

- A Calcium oxide B Lead(II) oxide
C Magnesium oxide D Zinc oxide

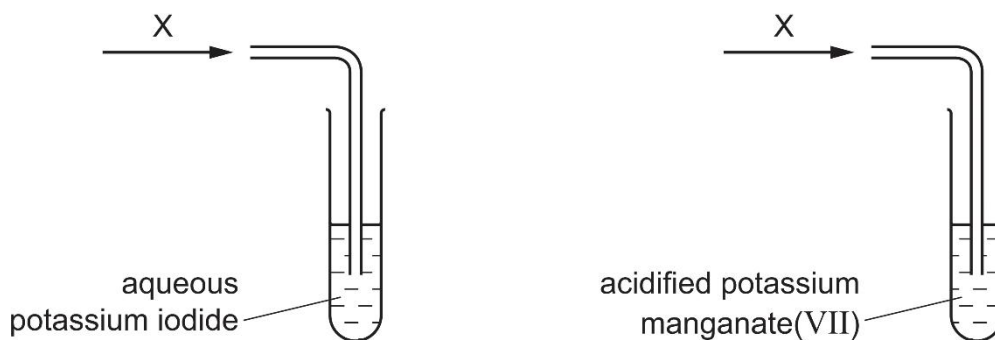
29. Zinc reacts with dilute sulfuric acid.



From this equation, what can be deduced about the reaction?

- A It is a redox reaction.
B It is exothermic.
C Zinc is acting as a base.
D Zinc is acting as a catalyst.

30. Gaseous compound **X** is an oxidising agent. **X** is bubbled through separate solutions of aqueous potassium iodide and acidified potassium manganate(VII).



Which row shows the colour changes when **X** is bubbled through these two solutions?

	aqueous potassium iodide	acidified potassium manganate(VII)
A	brown to colourless	no change
B	brown to colourless	purple to colourless
C	colourless to brown	no change
D	colourless to brown	purple to colourless

31. Which change always occurs when a metal atom is oxidised?

- A** It becomes positively charged.
- B** It combines with oxygen.
- C** It gains an electron.
- D** It gains a proton.

32. A compound decolourises acidified potassium manganate(VII).

What could this compound be?

- 1 magnesium chloride, MgCl_2
- 2 iron(II) chloride, FeCl_2
- 3 ethanol, $\text{C}_2\text{H}_5\text{OH}$

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

33. Which reactions involve oxidation and reduction?

- 1 chlorine gas reacting with aqueous potassium iodide
- 2 dilute sulfuric acid reacting with magnesium
- 3 dilute hydrochloric acid reacting with aqueous sodium hydroxide

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

34. Which reaction is a redox reaction?

- A $\text{Ca} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2$
 B $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$
 C $\text{CaO} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O}$
 D $\text{Ca(OH)}_2 + 2\text{HCl} \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O}$

35. Gas **X** turns acidified potassium manganate(VII) from purple to colourless.

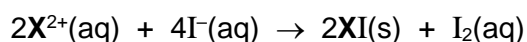
Gas **Y** turns aqueous potassium iodide from colourless to brown. What do these observations show about gas **X** and gas **Y**?

	gas X	gas Y
A	oxidising agent	oxidising agent
B	oxidising agent	reducing agent
C	reducing agent	oxidising agent
D	reducing agent	reducing agent

36. Reduction can be defined in terms of the gain or loss of oxygen or of hydrogen or of electrons. Which row correctly describes all three definitions of reduction?

	oxygen	hydrogen	electron
A	gain	loss	loss
B	gain	loss	gain
C	loss	loss	loss
D	loss	gain	gain

37. The coloured ions of metal **X** react with aqueous potassium iodide.



From this information, it can be deduced that **X** is most likely a1..... metal and the $\text{X}^{2+}(\text{aq})$ ions are2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	Group 2	oxidised
B	Group 2	reduced
C	transition	oxidised
D	transition	reduced

38. **Z** is a pollutant gas that is formed in internal combustion engines.

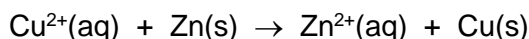
An aqueous solution of **Z** is acidic.

Z is removed from the exhaust gases in a catalytic converter by reduction.

What is **Z**?

- A** CO **B** N₂ **C** H₂O **D** NO₂

39. Pieces of zinc are added to aqueous copper(II) sulfate.

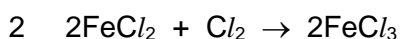
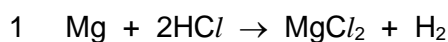


Which statement is correct?

- A** Cu²⁺(aq) is oxidised to Cu(s) by gaining electrons.
B Cu²⁺(aq) is reduced to Cu(s) by losing electrons.
C Zn(s) is oxidised to Zn²⁺(aq) by losing electrons.
D Zn(s) is reduced to Zn²⁺(aq) by gaining electrons.

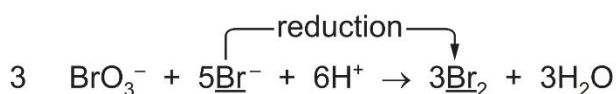
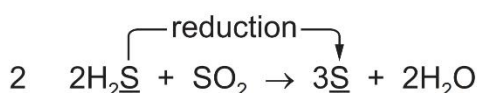
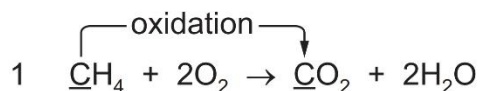
40. Many reactions can be classified as redox reactions.

Which equations show redox reactions?



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

41. In which equation(s) is the change in the underlined species correct?



- A** 1 only **B** 2 only **C** 1 and 3 **D** 2 and 3

42. The table gives some information about four redox reactions.

Which row gives correct information about what is oxidised and the evidence that this is oxidation?

	equation	what is oxidised in the reaction	evidence for this oxidation
A	$\text{CuO(s)} + \text{C(s)} \rightleftharpoons \text{CO(g)} + \text{Cu(s)}$	copper	copper(II) oxide has given oxygen to zinc
B	$\text{Na(s)} + \frac{1}{2}\text{Cl}_2\text{(g)} \rightleftharpoons \text{NaCl(s)}$	sodium	sodium has lost an electron
C	$\text{N}_2\text{(g)} + 3\text{H}_2\text{(g)} \rightleftharpoons 2\text{NH}_3\text{(g)}$	nitrogen	nitrogen has gained hydrogen
D	$\text{ZnCl}_2\text{(aq)} + \text{Mg(s)} \rightleftharpoons \text{Zn(s)} + \text{MgCl}_2\text{(aq)}$	zinc	zinc has gained two electrons

- Scan the QR Code below to view the answers to this assignment.



https://www.chemist.sg/redox/redox_mcq_ans.pdf