

Chem!stry

Name: ()

Class:

Date: / /

Assignment on Redox

Question 1:

Which one of the following elements is the most powerful **reducing agent**?

- A** Aluminium **B** Copper **C** Lead **D** Potassium

Question 2:

Which of the following changes is an example of **oxidation**?

- A** Chlorine atoms to chlorine molecules.
B Chloride ions to chlorine atoms.
C Copper(II) ions to copper atoms.
D Iron(III) ions to iron(II) ions.

Question 3:

Why does the colour of aqueous potassium bromide change when chlorine gas is bubbled into it?

- A** A compound is formed between chlorine and bromine.
B The chlorine oxidises bromide ions to bromine.
C A coloured solution of potassium chloride is formed.
D The potassium bromide is reduced.

Question 4:

When a metal atom becomes an ion it:

- A** Gains electrons and is reduced. **B** Gains protons and is oxidised.
C Loses electrons and is oxidised. **D** Loses electrons and is reduced.

Question 5:

Which one of the following equations does **not** represent a redox reaction?

- A $\text{Ba}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{BaSO}_4(\text{s})$
- B $\text{Br}_2(\text{g}) + 2\text{I}^{-}(\text{aq}) \rightarrow 2\text{Br}^{-}(\text{aq}) + \text{I}_2(\text{s})$
- C $\text{Cl}_2(\text{g}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{S}(\text{s}) + 2\text{Cl}^{-}(\text{aq})$
- D $\text{Cu}^{2+}(\text{aq}) + \text{Zn}(\text{s}) \rightarrow \text{Cu}(\text{s}) + \text{Zn}^{2+}(\text{aq})$

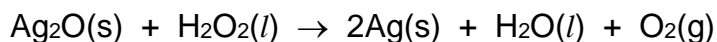
Question 6:

In which of the following changes is the nitrogen **reduced**?

- A NH_3 to NO
- B NH_3 to NO_3^{-}
- C N^{3-} to N_2
- D N_2 to NH_3

Question 7:

Hydrogen peroxide, H_2O_2 , reacts with silver oxide according to the following equation:



In this reaction, the hydrogen peroxide behaves as:

- A An acid.
- B A dehydrating agent.
- C A catalyst.
- D A reducing agent.

Question 8:

Which of the following oxides is most readily reduced to the metal by heating in a stream of hydrogen?

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

Question 9:

In which one of the following reactions is the underlined substance **reduced**?

- A $\underline{\text{Mg}} + 2\text{H}^{+} \rightarrow \text{Mg}^{2+} + \text{H}_2$
- B $\underline{\text{CO}_3^{2-}} + 2\text{H}^{+} \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- C $2\text{Fe}^{2+} + \underline{\text{Cl}_2} \rightarrow 2\text{Fe}^{3+} + 2\text{Cl}^{-}$
- D $\text{Br}_2 + \underline{2\text{I}^{-}} \rightarrow 2\text{Br}^{-} + \text{I}_2$

Question 10:

In which one of the following reactions is the underlined substance acting as a **reducing agent**?

- A chlorine + iron(II) chloride → iron(III) chloride
- B hydrogen + copper(II) oxide → copper + water
- C hydrochloric acid + magnesium oxide → magnesium chloride + water
- D zinc oxide + carbon monoxide → zinc + carbon dioxide

Question 11:

Which process does **not** involve either oxidation or reduction?

- A Formation of ammonium sulfate from ammonia and sulfuric acid.
- B Formation of nitrogen monoxide from ammonia.
- C Formation of sulfuric acid from sulfur.
- D Formation of zinc from zinc sulfide.

Question 12:

Which of the following 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 sodium chloride.

Question 13:

In which reaction does the oxidation state of the iron remain unchanged?

- A $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$
- B $2\text{FeCl}_2 + \text{Cl}_2 \rightarrow 2\text{FeCl}_3$
- C $\text{Fe} + 2\text{FeCl}_3 \rightarrow 3\text{FeCl}_2$
- D $\text{Fe}_2\text{O}_3 + 6\text{HCl} \rightarrow 2\text{FeCl}_3 + 3\text{H}_2\text{O}$

Question 14:

In which reaction does dilute sulfuric acid act as an **oxidising agent**?

- A $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$
- B $\text{ZnO} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2\text{O}$
- C $\text{Zn}(\text{OH})_2 + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + 2\text{H}_2\text{O}$
- D $\text{ZnCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2\text{O} + \text{CO}_2$

Question 15:

What does an oxidising agent do?

- A It turns acidified potassium dichromate(VI) green.
- B It turns acidified potassium manganate(VII) colourless.
- C It turns Universal Indicator red.
- D It turns aqueous potassium iodide brown.

Please write your answers to the multiple-choice questions in the table provided below:

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

Question 16:

a) Give the oxidation state of nitrogen in each of the following:

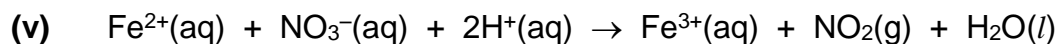
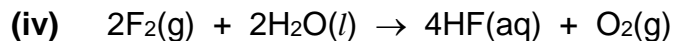
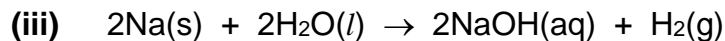
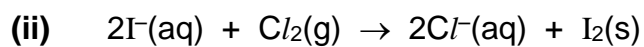
- (i) NH_3
- (ii) NO
- (iii) NO_2
- (iv) NO_3^-

b) Define oxidation in terms of change in oxidation states:

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c) What has been oxidised in each of the following reactions?

- (i) $\text{Zn}(\text{s}) + 2\text{H}^+(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{H}_2(\text{g})$
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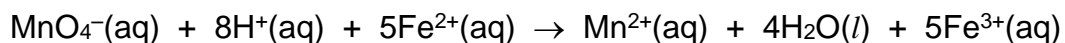


Question 17:

In an experiment to determine the mass of iron in steel, a sample of the steel was reacted with excess dilute sulfuric acid. During this reaction, the iron was converted to iron(II) sulfate.

- a) Write the balanced chemical equation, including state symbols, for the reaction of iron with dilute sulfuric acid.
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- b) The aqueous iron(II) sulfate produced was titrated with aqueous potassium manganate(VII), KMnO_4 . The ionic equation for this reaction is written below:



In the experiment, 0.0200 mol of potassium manganate(VII) ions were used.

- (i) Calculate the number of moles of iron(II) ions that reacted.
- (ii) Calculate the mass of iron in the sample.
- (iii) What is the name given to the type of chemical change that converts $\text{Fe}^{2+}(\text{aq})$ into $\text{Fe}^{3+}(\text{aq})$?
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- (iv) The colour of the aqueous potassium manganate(VII) changes during the reaction. Describe the colour change.

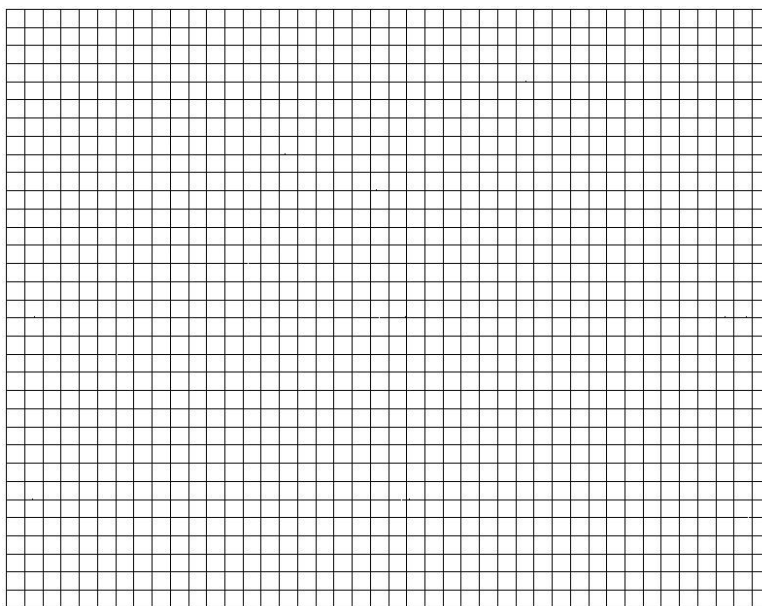
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Question 18:

The manufacture of sulfuric acid by the Contact Process can be represented by the following sequence:



Sketch a graph to illustrate how the oxidation state of sulfur varies during the different stages of the Contact Process.



Question 19:

Samples of polluted air containing sulfur dioxide (formula: SO_2) are passed through two reagents; acidified potassium manganate(VII) and aqueous potassium iodide.

a) From the following options, choose which colour change(s) were seen in each of the solutions. Indicate your choice by placing a tick () in the appropriate box.

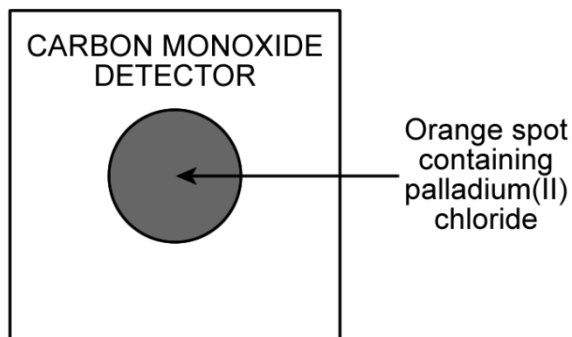
	Acidified Potassium Manganate(VII)	Aqueous Potassium Iodide	Answer
I	Colourless to purple.	Brown to colourless.	<input type="checkbox"/>
II	Orange to green.	No observed change.	<input type="checkbox"/>
III	Purple to colourless.	Colourless to brown.	<input type="checkbox"/>
IV	Purple to colourless.	No observed change.	<input type="checkbox"/>

b) Based on your choice made in **Question 19 a)** deduce whether sulfur dioxide is an oxidising agent or a reducing agent.

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Question 20:

Carbon monoxide detectors can be used in the home.

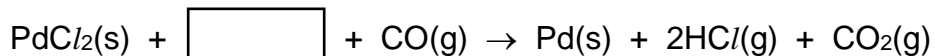


The orange spot turns black if there is a high concentration of carbon monoxide in the air.

a) Why is carbon monoxide hazardous?

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b) The spot turns black when palladium(II) chloride reacts with carbon monoxide to form palladium metal.



i) Complete the equation by writing the formula of the missing reactant in the box.

ii) Complete the table to show the oxidation states of palladium and carbon before and after the reaction takes place.

Element	Oxidation State <i>Before</i> Reaction	Oxidation State <i>After</i> Reaction
Palladium		
Carbon		

iii) Use information from the table to explain why this is a redox reaction.

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c) Name one industrial process that uses carbon monoxide as a reducing agent.

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- Scan the QR code below for the answers to this assignment.



http://www.chemist.sg/redox/redox_assignment_ans.pdf