	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	**DEPARTMENT: SCIENCE (2023-24)** **SUBJECT: CHEMISTRY**	**Date of completion:** **II week of September, 2023**
Worksheet No: 05 with answers	**TOPIC: REDOX REACTIONS**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT	**CLASS & SEC:**	**ROLL NO.**

MULTIPLE CHOICE QUESTIONS

1. Which of the following elements does not show variable oxidation states?

A) K B) S C) Br D) N

2. What is the oxidation number of S in H_2SO_4?

A) +1 B) +4 C) +6 D) -2

3. Which ion contains vanadium with an oxidation number of +4?

A) VO^{2+} B) VO_2^{+} C) VO_3^{-} D) VO_4^{3-}

4. In which reaction is Cu^{2+} acting as an oxidising agent?

A) $Cu^{2+} + 2Ag \rightarrow 2Ag^{+} + Cu$ B) $2Cu^{+} + O^{2-} \rightarrow Cu_2O$

C) $3Cu + O_2 \rightarrow Cu_2O + CuO$ D) $Cu + Hg^{2+} \rightarrow Hg + Cu^{2+}$

5. Which statement about the following reaction is correct?

$Ca(s) + H_2SO_4(aq) \rightarrow CaSO_4(aq) + H_2(g)$

A) Calcium acts as an oxidising agent

B) Calcium acts as a reducing agent

C) hydrogen molecules act as reducing agent

D) sulphate ion acts as oxidising agent

6. Which of the following is not a redox reaction?

A) $Mg + F_2 \rightarrow MgF_2$

B) $2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$

C) $Fe + 2HCl \rightarrow FeCl_2 + H_2$

D) $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$

7. Identify the element which undergoes disproportionation in the following reaction.

$2NaOH + Cl_2 \rightarrow NaCl + NaClO + H_2O$

A) Na B) Cl

C) O D) H

Assertion Reason Type

A) Both Assertion and Reason are correct statements and Reason is the correct explanation of the Assertion.

B) Both Assertion and Reason are correct statements and Reason is not the correct explanation of the Assertion.

C) Assertion is correct but Reason is wrong statement.

D) Assertion is wrong but Reason is correct statement.

8. ***Assertion (A)****:* The decomposition of hydrogen peroxide to form water and oxygen is an example of disproportionation reaction.

Reason (R)*:* The oxygen of peroxide is in –1 oxidation state and it is converted to zero oxidation state in O_2 and –2 in H_2O.

9. ***Assertion (A):*** Hydrogen reacts with oxygen to form water is a redox reaction.

Reason ***(R)****:* Hydrogen acts as an oxidising agent and oxygen as reducing agent.

10. ***Assertion (A):*** Standard electrode potential of potassium is more positive than that of

Aluminium.

Reason (R): Potassium is a stronger reducing agent than aluminium.

Read the given passage and answer the questions that follow:

Redox reactions are those reactions in which oxidation and reduction occur simultaneously. A redox reaction is made up of two half reactions. In the first half reaction, oxidation takes place and second half reduction occurs. Oxidation is a process in which a substance loses electrons and in reduction substance gains electrons. The substance which gains electrons is reduced and acts as an oxidizing agent. On the other hand, a substance which loses electrons is oxidized and acts as a reducing agent. The oxidation number of an atom increases during oxidation and reduces during reduction. The redox reactions may include combination of atoms or molecules displacement of metals or non-metals and disproportionation reaction.

11. What is the oxidation number of oxygen in O_2F_2? (1)

12. What is the value of *n* in the following ionic half equation? (1)

$$ClO_3^-(aq) + 6H^+(aq) + ne^- \rightarrow Cl^-(aq) + 3H_2O(l)$$

13. Write formulas for Tin(IV) oxide. (1)

14. In which of the following compounds does oxygen show a positive oxidation state?

NaClO or OF_2 (1)

15. ClO_4^- does not undergo disproportionation. Why? (1)

Question – Answer Type:

16. What are Disproportionation reactions? Give an example. (1)

17. Using Stock notation, represent the following compounds: (1)

i) V_2O_5 ii) Na_2S

18. Given the standard electrode potentials: (1)

$K^+/K = -2.93V$, $Ag^+/Ag = 0.80V$, $Ni^{2+}/Ni = -0.25V$,

$Ca^{2+}/Ca = -2.87V$. $Al^{3+}/Al = -1.66V$.

Arrange these metals in their increasing order of reducing power.

19. Define a redox couple. (1)

20. $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$ is not a redox reaction. Why? (1)

21. Balance the following redox reactions in acidic medium. (2 x 2)

i) $Cr_2O_7^{2-} + Sn^{2+} \rightarrow Cr^{3+} + Sn^{4+}$

ii) $MnO_4^- + S^{2-} \rightarrow Mn^{2+} + S$

22. Balance the following redox reactions in basic medium. (2 x 2)

i) $MnO_4^- + I^- \rightarrow MnO_2 + IO_3^-$

ii) $N_2H_4 + BrO_3^- \rightarrow NO + Br^-$

23. Depict the galvanic cell in which the reaction (3)
$2Al(s) + 3Fe^{2+}(aq) \rightarrow 2Al^{3+}(aq) + 3Fe(s)$ takes place, Further show:

(i) which of the electrode is negatively charged,
(ii) the carriers of the current in the cell
(iii) individual reaction at each electrode.

24. Calcium hypochlorite, $Ca(ClO)_2$, is used for water treatment in swimming pools. It is produced in the reaction between $Ca(OH)_2$ and Cl_2 . (3)

$2Ca(OH)_2 + 2Cl_2 \rightarrow Ca(ClO)_2 + CaCl_2 + 2H_2O$

State the type of reaction occurring in the production of $Ca(ClO)_2$. Justify your answer using oxidation numbers.

ANSWERS

1.	A) K
2.	C) +6
3.	A) VO^{2+}
4.	A) $Cu^{2+} + 2Ag \rightarrow 2Ag^{+} + Cu$
5.	B) Calcium acts as a reducing agent
6.	D) $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$
7.	B) Cl
8.	A) Both Assertion and Reason are correct statements and Reason is the correct explanation of the Assertion
9.	C) Assertion is correct but Reason is wrong statement.
10.	D) Assertion is wrong but Reason is correct statement.
11.	+1
12.	n = 6
13.	SnO_2
14.	OF_2
15.	In ClO_4^-, chlorine is present in its highest oxidation state.
16.	Disproportionation reactions are redox reactions in which an element in one oxidation state is simultaneously oxidised and reduced. Eg:- $2H_2O_2\ (aq) \rightarrow 2H_2O(l) + O_2(g)$

17.	i) $V_2(V)O_5$ ii) $Na_2(I)S$
18.	$Ag^+/Ag < Ni^{2+}/Ni < Al^{3+}/Al < Ca^{2+}/Ca < K^+/K$
19.	A redox couple is defined as having together the oxidised and reduced forms of a substance taking part in an oxidation or reduction half reaction.
20.	No change in oxidation number for any of the elements.
21.	i) $Cr_2O_7^{2-} + 14H^+ + 3\ Sn^{2+} \rightarrow 2Cr^{3+} + 3Sn^{4+} + 7H_2O$ ii) $2MnO_4^- + 5S^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 8H_2O + 5S$
22.	i) $2MnO_4^- + H_2O + I^- \rightarrow 2MnO_2 + 2OH^- + IO_3^-$ ii) $3N_2H_4 + 4BrO_3^- \rightarrow 6NO + 4Br^- + 6H_2O$
23.	Cell representation is: $Al_{(s)} \mid Al^{3+}_{(aq)} \parallel Fe^{2+}_{(aq)} \mid Fe_{(s)}$ (i) Aluminium (ii) Electrons (iii) <u>At anode</u> $Al_{(s)} \rightarrow Al^{3+}_{(aq)} + 3\ e^-$ <u>At cathode</u> $Fe^{2+}_{(aq)} + 2\ e^- \rightarrow Fe_{(s)}$
24.	Disproportionation reaction. Oxidation number of chlorine is 0 in Cl_2, +1 in $Ca(ClO)_2$ and –1 in $CaCl_2$ Chlorine is oxidised from 0 to +1 and reduced from 0 to –1

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