

Class: 12

Subject: chemistry

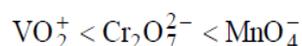
Topic: d_f

No. of Questions: 20

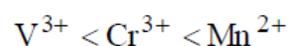
Duration: 60 Min

Maximum Marks: 60

1. **Assertion (A)** Oxidising power of the oxides is in order:



Reason (R) Stability of the reduced species is in order



- Both (A) and (R) are true and (R) is the correct explanation of (A).
- Both (A) and (R) are true but (R) is not the correct explanation of (A).
- (A) is true but (R) is false.
- (A) is false but (R) is true.

Ans. A

2. Which one of the following is ferromagnetic?

- Copper
- Nickel
- Chromium
- Manganese

Ans. B

Solution:

Iron, cobalt and nickel are ferromagnetic materials

3. Of the following outer electronic configurations of atoms, the highest oxidation state is achieved by which one of them?

- $(n-1)d^3 ns^2$
- $(n-1)d^5 ns^1$
- $(n-1)d^8 ns^2$
- $(n-1)d^5 ns^2$

Ans. D

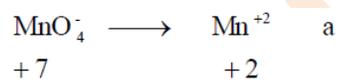
4. **Assertion (A)** The purple colour of KMnO_4 is due to the charge transfer transition.
Reason (R) The intense colour, in most of the transition metal complexes is due to d-d transition.
- Both (A) and (R) are true and (R) is the correct explanation of (A).
 - Both (A) and (R) are true but (R) is not the correct explanation of (A).
 - (A) is true but (R) is false.
 - (A) is false but (R) is true.

Ans. B

5. In acidic medium, one mole of MnO_4^- accepts how many moles of electrons in a redox process?
- 1
 - 3
 - 5
 - 6

Ans. C

Solution:



Oxidation number decrease by 5 units

6. Number of electrons transferred in each case when KMnO_4 acts as an oxidising agent to give MnO , Mn , $\text{Mn}^{2+}(\text{OH})$ and MnO_2 respectively are
- 3, 5, 4 and 1
 - 4, 3, 1 and 5
 - 1, 3, 4 and
 - 5, 4, 3 and 1

Ans. A

Solution:

+7		+4	
KMnO ₄	→	MnO ₂	: change = 3e-
+7		+2	
KMnO ₄	→	Mn	: change = 5e-
+7		+3	
KMnO ₄	→	Mn(OH) ₃	: change = 4e-
+7		+6	
KMnO ₄	→	MnO ₄ ²⁻	: change = 1e-

This order is found in option 1

7. The highest magnetic moment is shown by the transition metal ion with the configuration
- 3d⁵
 - 3d²
 - 3d⁹
 - 3d⁷

Ans. A

Solution;

d⁵ configuration has the highest number of unpaired electrons

8. The general outer electronic configuration of transition elements is
- (n - 1)d¹⁻¹⁰ ns¹
 - (n - 1)d¹⁰ ns²
 - (n - 1)d¹⁻¹⁰ ns¹⁻²
 - (n - 1)d⁵ ns¹

Ans. C

Solution:

The outer electronic configuration is either ns¹ or ns². The configuration of (n - 1) d orbitals can vary between 1 to 10

9. Which one of the following forms a colourless solution in aqueous medium?
(Atomic numbers: Sc = 21, Ti = 22, V = 23, Cr = 24)
- Cr³⁺
 - Ti³⁺
 - Sc³⁺
 - V³⁺

Ans. C

Solution:

Ion	Electronic configuration	Number of unpaired electrons
Cr^{3+}	$[\text{Ar}] 3d^3$	3
Ti^{3+}	$[\text{Ar}] 3d^1$	1
Sc^{3+}	$[\text{Ar}] 3d^0$	0
V^{3+}	$[\text{Ar}] 3d^2$	2

So Sc^{3+} with no unpaired electrons form colourless solution

10. In which of the following compound manganese is amphoteric?

- MnO
- Mn_2O_3
- Mn_2O_7
- None

Ans. B

Solution:

Ions in +3 and +4 states are amphoteric. In states higher than this the ions are acidic and lower than this they are basic. So MnO is basic. Mn_2O_3 is amphoteric and Mn_2O_7 is acidic

11. **Assertion (A)** Ionic radii of Ta and Nb are same.

Reason (R) The lanthanide contraction cancels almost exactly the normal size increase on descending a group of transition elements.

- Both (A) and (R) are true and (R) is the correct explanation of (A).
- Both (A) and (R) are true but (R) is not the correct explanation of (A).
- (A) is true but (R) is false.
- (A) is false but (R) is true.

Ans. A

12. Which of the following compounds is not coloured?

- $\text{Na}_2[\text{CuCl}_4]$
- $\text{Na}_2[\text{CdCl}_4]$
- $\text{K}_4[\text{Fe}(\text{CN})_6]$
- $\text{K}_3[\text{Fe}(\text{CN})_6]$

Ans. C

Solution:

$\text{K}_4[\text{Fe}(\text{CN})_6]$ contains no unpaired electrons. Hence is colourless

13. Which of the following is likely to form white salts?

- a. Cu^{2+}
- b. Sc^{3+}
- c. Ti^{3+}
- d. Fe^{3+}

Ans. B

Solution;

Sc^{3+} has no unpaired electrons. Hence it is expected to form white salts

14. Which of the following has the maximum number of unpaired d-electron?

- a. Zn^{2+}
- b. Fe^{2+}
- c. Ni^{3+}
- d. Cu^+

Ans. B

Solution:

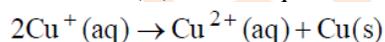
Species	Atomic Number	No. of electrons Lost	No. of Electrons Present	Electronic configuration	Number of unpaired electrons
Zn^{2+}	30	2	28	$[\text{Ar}] 3d^{10} 4s^1$	0
Fe^{2+}	26	2	24	$[\text{Ar}] 3d^6 4s^0$	4
Ni^{3+}	28	3	25	$[\text{Ar}] 3d^7 4s^0$	3
Cu^+	29	1	28	$[\text{Ar}] 3d^{10} 4s^0$	0

15. d-block elements form coloured ions because

- a. They absorb some energy for d-s transition
- b. They absorb some energy for p-d transition
- c. They absorb some energy for d-d transition
- d. They do not absorb any energy

Ans. C

16. **Assertion (A)** Cu^+ in aqueous solution undergoes disproportionation.



Reason (R) $\Delta G^\circ = -nFE^\circ$

- a. Both (A) and (R) are true and (R) is the correct explanation of (A).
- b. Both (A) and (R) are true but (R) is not the correct explanation of (A).
- c. (A) is true but (R) is false
- d. (A) is false but (R) is true.

Ans. B

17. Which one of the following does not show different oxidation states?

- Iron
- Copper
- Zinc
- Manganese

Ans. C

Solution:

Zn shows only one oxidation state of +2

18. Which of the following ions having following electronic structure would have maximum magnetic moment

- $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3$
- $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$
- $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7$
- $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$

Ans. B

Solution:

In option 2 maximum number of 5 unpaired electrons are present. Hence it shows maximum magnetic moment

19. **Assertion (A)** CrO_3 is an acidic oxide.

Reason (R) CrO_3 liberates CO_2 with Na_2CO_3 .

- Both (A) and (R) are true and (R) is the correct explanation of (A).
- Both (A) and (R) are true but (R) is not the correct explanation of (A).
- (A) is true but (R) is false.
- (A) is false but (R) is true.

Ans. B

20. Which of the following oxides of chromium is amphoteric in nature?

- CrO
- Cr_2O_3
- CrO_3
- None of these

Ans. C

Solution

CrO - basic Cr_2O_3 - amphoteric CrO_3 - Acidic. With the increasing oxidation number acid character and oxidising power increases