INORGANIC CHEMISTRY TIME :30 Min

SECTION–I(i) : (Maximum Marks : 45)

- This section contains **15** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
- For each question, marks will be awarded in one of the following categories :

Full Marks : +3 If only the bubble corresponding to the correct option is darkened.
Zero Marks : 0 If none of the bubbles is darkened.
Negative Marks : –1 In all other cases

1. Which of the following statement is **CORRECT**?

(A) Ce^{+4} has noble gas configuration (B) Yb^{+2} and Eu^{+2} both have half filled $4f$ sub shell

(C) Th^{+4} has completely filled $5f$ level (D) All are correct

2. The radius of La^{+3} is 1.06 Å which of the following given values will be closest to the radius of Lu^{+3} (At. number of Lu = 71, La = 57)

(A) 1.6 Å (B) 1.4 Å (C) 1.06Å (D) 0.85 Å

3. Which of the following is not arranged in correct sequence ?

(A) MO, M_2O_3, MO_2, M_2O_5 - decreasing order of basic nature (M = d block metal)

(B) Sc, Ti, V, Cr, Mn - increasing order of highest possible oxidation state

(C) d^5, d^3, d^1, d^4 - increasing magnetic moment

(D) Mn^{+2}, Fe^{+2}, Cr^{+2}, Co^{+2} - decreasing stability

4. Which of the following compounds are coloured in aq. solution

(A) $Ce(SO_4)_2$ (B) $TiCl_4$ (C) Cu_2Cl_2 (D) $ZnSO_4.7H_2O$

5. Which of the following will act as best oxidizing agent.

(A) CrO_3 (B) MoO_3 (C) WO_3 (D) All of these

6. Consider the following statement which of the following is not true ?

(A) Eu^{+2} is a strong reducing agent (Z of Eu = 63)

(B) Ce^{+4} is a strong oxidising agent (Z of Ce = 58)

(C) Curium have electronic configuration - $[Rn]\ 5f^7\ 6d^1\ 7s^2$ (Z of Cm = 96)

(D) Yb^{+2} is a oxidising agent (Z of Yb = 70)

7. Which of the following statement is **INCORRECT** ?

(A) Np is one of the trans-uranium element

(B) Pm is the only synthetic radioactive lanthanide

(C) LnC_2 on hydrolysis gives C_2H_2

(D) Actinide contraction is result of poor shielding of 4f-electrons.

8. $[X] \underset{H^+}{\overset{OH^-}{\rightleftharpoons}} [Y]$

Both [X] and [Y] produce ink blue solution with H_2O_2 in presence of organic solvents and H_2SO_4, [X] & [Y] respectively

(A) MnO_4^-, MnO_4^{-2} (B) $Cr_2O_7^{-2}, CrO_4^{-2}$ (C) $CrO_4^{-2}, Cr_2O_7^{-2}$ (D) SO_3^{-2}, SO_4^{-2}

9. Select the **CORRECT** statement ?

(A) Stability of $Cu^{+2}_{(aq)}$ is greater than $Cu^{+1}_{(aq)}$ due to much more negative $\Delta H^{\ominus}_{hydration}$ of Cu^{+2}

(B) $Cu^{+2}_{(aq)}$ is more stable because IE_2 of Cu is less than IE_1

(C) Generally salts Cu^{+2} are diamagnetic & colour less

(D) SRP (E^o) of Cu^{+2}/Cu is negative

10. Which of the following statement is **INCORRECT** for K_2MnO_4 ?

(A) It is prepared by MnO_2 in acidic medium

(B) It produce brown coloured compound on addition of water

(C) It produce $KMnO_4$ on addition of water

(D) It produce purple colour compound with O_3

11. Which of the following is not correct about the chemistry of 3d and 4f series elements?

(A) 3d elements show more oxidation state than 4f series elements

(B) The energy difference between 3d and 4s orbital is very little.

(C) Europium (II) is more stable than cerium (II)

(D) The magnetic character in 3d series elements increases from scandium to copper

12. Chromate changes its yellow colour into orange by the addition of

(A) H_2O (B) acid (C) alkali (D) All are correct

13. The lowest degree of paramagnetism is shown by :

(A) $MnSO_4.4H_2O$ (B) $FeSO_4.6H_2O$ (C) $CuSO_4.5H_2O$ (D) $NiSO_4.6H_2O$

14. When chromite ore is heated with Na_2CO_3 strongly followed by cooling and washing with water, then brown residue is obtained which is of

(A) Fe_2O_3 (B) $Fe_2O_3.FeO$ (C) Na_2CrO_4 (D) $FeO.Cr_2O_3$

15. Which of the following is/are **NOT** a common characteristics properties of transition elements-

(A) Formation of interstial compounds

(B) Imparts different characteristics colours to oxidising flame

(C) Irregular trend in ionisation energy & radius in a series

(D) Catalytic properties

SECTION-I(ii) : (Maximum Marks: 12)

- This section contains **THREE** questions.
- Each question has **FOUR** options for correct answer(s). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct option(s).
- For each question, choose the correct option(s) to answer the question.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks	: +4	If only (all) the correct option(s) is (are) chosen.
Partial Marks	: +3	If all the four options are correct but ONLY three options are chosen.
Partial Marks	: +2	If three or more options are correct but ONLY two options are chosen, both of which are correct options.
Partial Marks	: +1	If two or more options are correct but ONLY one option is chosen and it is a correct option.
Zero Marks	: 0	If none of the options is chosen (i.e. the question is unanswered).
Negative Marks	: –2	In all other cases.

16. When H_2O_2 reacts with $Ce(SO_4)_2$:-
(A) Ce^{+4} is oxidised to higher oxidation state
(B) Ce^{+3} is produced
(C) O_2 is produced
(D) H_2 is evolved

17. When MnO_2 is fused with KOH, a purple green coloured compound is formed. Choose correct statements about purple green coloured compound
(A) It disproportionates in acidic medium (B) It is paramagnetic in nature
(C) Geometry is tetrahedral (D) It uses non axial d-orbital in hybridisation

18. Reaction which involve redox change is/are

(A) $Cu^{+2} + \overline{C}N_{(Excess)} \longrightarrow$ (B) $FeS \xrightarrow{\text{Roasting}}$

(C) $CO_2 + MnO_4^- \xrightarrow{\text{weak alkaline solution}}$ (D) $Na_2CrO_4 + H_2SO_4 \longrightarrow$

SECTION–I(iii) : (Maximum Marks : 6)

- This section contains **ONE** paragraph.
- Based on each paragraph, there are **TWO** questions.
- Each question has **FOUR** options (A), (B), (C) and (D) **ONLY ONE** of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
- For each question, marks will be awarded in one of the following categories :
  Full Marks : +3 If only the bubble corresponding to the correct answer is darkened.
  Zero Marks : 0 In all other cases.

Paragraph for Q. No. 19 & 20

(X) is very important laboratory reagent which is prepared by its naturally occuring ore which is called pyrolusite. Pyrolusite when fused with alkali in the presence of O_2, green compound **(Y)** is produced.

(Y) is converted into **(X)** by electrolysis or by using ozone.

19. On small scale **(X)** is prepared by disproportion of **(Y)** in acidic solution. Which of the following is produced by disproportion of **(Y)** in slight alkaline solution.

(A) $KMnO_4$, Mn^{+2} (B) $KMnO_4$, MnO_2
(C) MnO_2, Mn^{+2} (D) K_2MnO_4, Mn^{+2}

20. Select the correct statements :

(A) **(X)** is tetrahedral & diamagnetic

(B) **(Y)** is tetrahedral & paramagnetic

(C) **(X)** produce dimangnese hepta oxide (oily liquid) with conc. H_2SO_4

(D) All are correct