"CULTIVATING EXCELLENCE IN EVERY STUDENT"

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Class:-XII (Sci.) **Name of Student……**
Subject: - Chemistry

Assignment
d & f-block elements

1. Give reasons for the following:-
(a)As compared to elements of the first transition series, heavier transition metals of second & third transition series show more frequent metal – metal bonding.
(b)Elements of second and third d series have similar radii.
(c)The unipositive transition metal ion have d^n configuration.
(d)Scandium (II) is virtually unknown. (e)Titanium (IV) is more stable than Titanium (II) or Titanium (III).
(f) Oxidation states in transition elements vary from each other by unity (eg V(II) V(III) V(IV) V(V) whereas oxidation states of non transition states normally differ by a unit of two.
(g)In non transition elements; lower transition state is favoured by heavier elements whereas in transition elements higher transition state is favoured by heavier elements.
(h)E^0M^{+2} /M value for Mn, Ni & Zn is more negative expected.
(i) Highest Mn fluoride is MnF_4 with Mn in +4 O.S. whereas highest Mn oxide is Mn_2O_7 with Mn in +7 O.S. (j) For Cu $\Delta_iH^0{}_1$= 745 KJ/mol whereas $\Delta_iH^0{}_2$ = 1940 KJ/mol, Inspite of very high second ionization enthalpy more stable O.S. of Cu in aqueous medium is +2. (k) V_2O_3 is basic while V_2O_5 is amphoteric. (l) Lanthanides resemble each other more closely than do members of ordinary transition series (m) La & Lu do not show any colour. (n)Actinides show greater range of O.S. as compared to lanthanides. (o)Ionization enthalpy of early actinides is lower than that of early lanthanides. (p)Study of actinides is comparatively difficult.
2. An yellow translucent solution is obtained on passing H_2S gas through an acidified solution of $KMnO_4$. Identify the solution and write the balanced chemical equation.
3. Zr (4d series) and Hf (5d series) have similar radi and have similar physical and chemical properties. Explain why?
4. Ce^{4+} has a noble gas electronic configuration, but it is used as an oxidizing agent in volumetric analysis. Give reason.
5. State why Fluorine stabilizes higher oxidation states?
6. CrO_4^{2-} is a strong oxidizing agent while $MnO4^{2-}$ is not. Why?
7. Why is Cu_2Cl_2 colourless and $CuCl_2$ coloured?
8. Which is stronger base $La(OH)_3$ or $Lu(OH)_3$? Why?
9. It is found that Ce^{4+} is a good oxidizing agent whereas Sm^{2+} is a good reducing agent. State the reason for this difference.
10. Actinide contraction is greater from element to element than lanthanide contraction. Why?
11. Mn^{2+} is more stable than Mn^{3+}. Give the reason?
12. Observe the following equation and identify the phenomenon takes place:

$$3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$$

13. $Cr_2O_7^{2-} \leftrightarrow 2CrO4^{2-}$. How does this equilibrium can be shifted to right?

14. Cu^+ is unstable in aqueous solution and disproportionate as $2Cu^+ \rightarrow Cu^{2+} + Cu$, Why does Cu^+ disproportionate in aqueous solution?
15. Among the oxides of Chromium CrO_3 is acidic, Cr_2O_3 is amphoteric and CrO is basic. State reasons for these observations.
16. A wellknown orange crystalline compound (A) when burnt impart violet colour to flame. (A) on treating (B) and conc. H_2SO_4 gives red gas (C) which gives red yellow solution (D) with alkaline water. (D) On treating with acetic acid and lead acetate gives yellow p. pt. (E). (B) Sublimes on heating. Also on heating (B) with NaOH gas (F) is formed which gives white fumes with HCl. What are (A) to (F)?
17. A mixed oxide of iron and chromium $FeOCr_2O_3$ is fused with Sodium Carbonate in presence of air to form a yellow coloured compound (A). On acidification the compound (A) forms an orange coloured compound (B) which is a strong oxidizing agent. (i) Identify the compounds (A) and (B) (ii) Write balanced chemical equations for each step.
18. (a) A blackish brown coloured solid (A) when fused with alkali metal hydroxides in presence of air produces a dark green compound (B), which on electrolytic oxidation in alkaline medium gives a dark purple compound (C). Identify (A), (B) and (C) and write balanced chemical equations for the reactions involved. (b) What happens when an acidic solution of the green coloured compound (B) is allowed to stand for some time? Give the equation of the reaction involved. What is this type of reaction called?
19. (A) reacts with H_2SO_4 to form purple coloured solution (B) which reacts with KI to form colourless compound (C). The colour of (B) disappears with acidic solution of $FeSO_4$. With concentrated H_2SO_4 (B) forms (D) which can decompose to give a black compound (E) and O_2. Identify (A) to (E) and write equations for the reactions involved.
20. What is the equivalent wt. of KMnO4 in: (a) Acidic Medium (b) Neutral Medium?
(c) In alkaline Medium
21. K_2Pt (IV) Cl_6 is well known compound and corresponding Ni^{4+} Salt it unknown? Whereas Ni^{+2} is more stable than Pt^{+2}. **22.** What is aqua regia? Why gold, Pt are dissolved in it?

Some Important Terms :

Compounds / Minerals / Reagents or mixtures etc of d- and f- block elements.

1. Argentite — Ag_2S
2. Argenti ferrous galena — $PbS + Ag_2S$
3. Azurite — $Cu(OH)_2 . 2 CuCO_3$
4. Benedict Solution — Alkaline Solution cupric ions complexed with citrate ions.
5. Blue Vitriol — $CuSO_4.5 H_2O$ (Blue Stone)
6. Bayer's Reagent — Cold alkaline $KMnO_4$ solution
7. Blister Copper — 99% Pure Copper
8. Corrosive Sublimate — $HgCl_2$
9. Calomel — Hg_2Cl_2
10. Calamine — $ZnCO_3$
11. Coinage metal — Cu, Ag and Au
12. Copper Pyrite — $CuFeS_2$ or $Cu_2S . Fe_2S_3$
13. Copper glance — Cu_2S
14. Cinnabar — HgS
15. Chromyl Chloride — CrO_2Cl_2
16. Chrome Yellow — $PbCrO_4$(Lemon Chrome)
17. Calaverite — $AuTe_2$
18. Chromic acid mixture — K_2CrO_7 + Con. H_2SO_4
19. Delomite — $CaCO_3 . MgCO_3$
20. Delta Metal — Cu (55%), Zn (41%), Fe (4%)
21. Fischer's Salt — K3 $[CO(NO_2)_4]$
22. Fehling Solution — $CuSO_4$ + Sod. Pot. Tartarate + NaOH
23. Green Vitriol — $FeSO_4 . 7 H_2O$ (Hara Kasis)
24. Ferro Chrome — Fe + 2 Cr + 4 CO
25. Guigret's green — $Cr_2O_3 . 2 H_2O$
26. Haematite — Fe_2O_3 (Red Haematite)
27. Horn Silver — AgCl(Chloragynite)
28. Lucas reagent — Conc. HCl + anhydrous $ZnCl_2$
29. Lunar Caustic — $AgNO_3$
30. Lithopone — $ZnS + BaSO_4$
31. Lindar Catalyst — Palladised Charcoal deactivated with Sulphur compounds.
32. Malachite — $Cu(OH)_2 . 2 CuCO_3$
33. Monel Metal — Cu, Ni and Mn
34. Nesseler's reagent — K_2HgI_4
35. Prussian blue — $Fe_4 [Fe(CN)_6]_3$

36. Pyrites (Fool's Gold) — FeS_2
37. Quick Silver — Hg
38. Schweitzer reagent — Tetramine Copper (II) Sulphate
39. Sterling Silver — Solution of Cu in Hg
40. Scheelite — $CaWO_4$ (Calcium tungstate)
41. Tollen's reagent — $AgNO_3$ + NaOH
42. Tailing of mercury — Hg_2O
43. Vermilion — HgS
44. Willemite — Zn2SiO4
45. Zincite — ZnO
46. Zinc butter — $ZnCl_2$. 3 H_2O
47. Misc metal — La (95%), Fe (5%) & traces of sulphur Mn etc.