

TEST INFORMATION

DATE : 03.05.2015

ALL INDIA OPEN TEST (AIOT) - 02

Syllabus : Full Syllabus

DPP No. # 08 (JEE-ADVANCED)

Total Marks : 169

Max. Time : 137 min.

Single choice Objective (–1 negative marking) Q.1 to Q.15	(3 marks 2½ min.)	[45, 37½]
Multiple choice objective (–1 negative marking) Q.16 to Q.20	(4 marks, 3 min.)	[20, 15]
Assertion and Reason ('–1' negative marking) Q.21 to Q.23	(3 marks 2½ min.)	[09, 7½]
Comprehension (–1 negative marking) Q.24 to Q.32	(3 marks 2½ min.)	[27, 22½]
Single Digit Subjective Questions (no negative marking) Q.33 to Q.41	(4 marks 2½ min.)	[36, 22½]
Match the column (4 vs 4) (no negative marking) Q.42 to Q.43	(8 marks, 8 min.)	[16, 16]
Match the column (4 vs 5) (no negative marking) Q.44 to Q.45	(8 marks, 8 min.)	[16, 16]

- Which of the following statements is false ?
 (A) In 3d series, there is a regular increase in the first ionisation enthalpy of transition elements from left to right.
 (B) In 3d series, the negative value of standard electrode potential (E^0) for M^{2+}/M decreases in the order $Ti > Mn > Cr > Fe$.
 (C) The decrease in metallic radius coupled with increase in atomic mass results in a general increase in the density of transition elements from Ti to Cu.
 (D) The higher oxidation state are favoured by the heavier elements (i.e. heavier members) in the groups of d-block.
- Extraction of zinc from zinc blende is done industrially by :
 (A) electrolytic reduction (B) roasting followed by reduction with carbon
 (C) roasting followed by reduction with another metal (D) roasting followed by self-reduction
- Which of the nitrates on strong heating leaves the metal as the residue ?
 (A) $AgNO_3$ (B) $Pb(NO_3)_2$ (C) $Cu(NO_3)_2$ (D) $Al(NO_3)_3$
- Manganous salt in presence of catalyst zinc sulphate or zinc oxide is oxidised by potassium permanganate in neutral or faintly alkaline medium to :
 (A) MnO_2 (B) Mn_2O_7 (C) Mn_2O_3 (D) Can not be oxidised
- V_2O_5 reacts with alkalis to give :
 (A) VO_4^{3-} (B) VO_4^+ (C) VO^{2+} (D) VO_2^{2+}
- A white crystalline substance dissolves in water. On passing H_2S gas in this solution, a black precipitate is obtained. The black precipitate dissolves completely in hot HNO_3 . On adding a few drops of conc. H_2SO_4 , a white precipitate is obtained. This precipitate is that of :
 (A) $BaSO_4$ (B) $SrSO_4$ (C) $PbSO_4$ (D) $CdSO_4$
- Salt mixture $\xrightarrow{\text{dil. HCl}}$ white ppt. $\xrightarrow[\text{under hot condition}]{\text{Heated and filtered}}$ Filtrate $\xrightarrow{\text{Cooled}}$ white needle like crystal
 Residue $\xrightarrow{NH_3 \text{ Sol.}}$ Clear solution
 Salt is consisting of cations :
 (A) Pb^{2+} and Hg^{2+} (B) Ag^+ and Hg_2^{2+} (C) Pb^{2+} and Ag^+ (D) None of these

- 8.** An aqueous solution of a substance (X) gives a black precipitate on treatment with H₂S gas in presence of NH₄OH and NH₄Cl which dissolves in aqua regia on heating. The ammoniacal solution of substance (X) gives red precipitate with dimethylglyoxime. The substance (X) is :
 (A) Cu²⁺ salt (B) Fe³⁺ salt (C) Ni²⁺ salt (D) Pb²⁺ salt
- 9.** Consider the following metallurgical processes :
 (i) Heating impure metal with CO and distilling the resulting volatile carbonyl (boiling point 43°C) and finally decomposing at 150°C to 200°C to get the pure metal.
 (ii) Heating the sulphide ore in air until a part is converted to oxide and then further heating in the absence of air to let the oxide react with unchanged sulphide.
 (iii) Electrolysing the molten electrolyte containing approximately equal amounts of the metal chloride and CaCl₂ to obtain the metal.
 The process used for obtaining sodium, nickel and copper are, respectively,
 (A) (i), (ii) and (iii) (B) (ii), (iii) and (i) (C) (iii), (i) and (ii) (D) (ii), (i) and (iii)
- 10.**
- ```

 graph LR
 IM[Impure metal] -- "I2" --> MI[Metal iodide Vapour]
 MI -- "Heat" --> PM[Pure Metal + I2]
 PM -- "Reused" --> I2[I2]
 I2 -- "I2" --> IM

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- The above method of purification is :  
 (A) Van – arkel process for Zr, Hg etc                  (B) Distillation for Zn, Cd, Hg etc  
 (C) Electro refining for W, Ag, Au, etc                  (D) Zone refining of germanium, gallium, silicon etc.
- 11.** Which of the following is desirable as a slag in extraction of copper but not during the extraction of iron ?  
 (A) CuFeS<sub>2</sub>                  (B) FeSiO<sub>3</sub>                  (C) CaSiO<sub>3</sub>                  (D) CuSiO<sub>3</sub>
- 12.** Which of the following is not correctly matched with respect to the processes involved in the extractive metallurgy of the respective metal ?  
 (A) Al<sub>2</sub>O<sub>3</sub>.2H<sub>2</sub>O → Al : Leaching, precipitation, calcination and electrolytic reduction (molten state).  
 (B) Ag<sub>2</sub>S → Ag : Leaching and displacement method.  
 (C) PbS → Pb : Froth flotation process, roasting and self reduction.  
 (D) KCl.MgCl<sub>2</sub>.6H<sub>2</sub>O → Mg : Dehydration by simple heating and electrolytic reduction (molten state).
- 13.** Which of the following will not give positive chromyl chloride test :  
 (A) Copper chloride, CuCl<sub>2</sub>                  (B) Mercuric chloride, HgCl<sub>2</sub>  
 (C) Zinc chloride, ZnCl<sub>2</sub>                  (D) Aniline hydro chloride C<sub>6</sub>H<sub>5</sub>NH<sub>2</sub>.HCl
- 14.** Which of the following statements is correct for matte which is formed during extraction of copper ?  
 (A) Matte is a molten mixture of mostly cuprous sulphide and a little iron sulphide  
 (B) Matte is a solid mass consisting of CuO and FeO.  
 (C) Matte is a molten mixture largely consisting of CuS and FeS<sub>2</sub>.                  (D) None of these
- 15.\_** H<sub>2</sub>S and SO<sub>2</sub> can be distinguished by :  
 (A) Litmus paper                  (B) MnO<sub>4</sub><sup>-</sup>                  (C) (CH<sub>3</sub>COO)<sub>2</sub>Pb                  (D) None of these
- 16.\*** Which of the following statements is/are true about Mohr’s salt ?  
 (A) It decolourises KMnO<sub>4</sub>                  (B) It gives NH<sub>3</sub> on heating with KOH.  
 (C) It is a double salt                  (D) Oxidation state of iron is +3 in this salt
- 17.\*** Suppose Cu<sup>2+</sup> and Pb<sup>2+</sup> both are present in a mixture, then they can be separated by :  
 (A) adding KI solution                  (B) adding NH<sub>3</sub> solution  
 (C) adding NaOH solution                  (D) adding dilute HCl (2M)
- 18.\*** In electrolysis of Al<sub>2</sub>O<sub>3</sub> by Hall-Heroult process :  
 (A) cryolite Na<sub>3</sub>[AlF<sub>6</sub>] lowers the melting point of Al<sub>2</sub>O<sub>3</sub> and increases its electrical conductivity.  
 (B) Al is obtained at cathode and probably CO<sub>2</sub> at anode  
 (C) electrolysis is carried out in aqueous medium    (D) anode consist of graphite
- 19.\_** Heating which of the following salts in a dry test tube may cause a change in their colour ?  
 (A) ZnCO<sub>3</sub> (white)                  (B) Co(NO<sub>3</sub>)<sub>2</sub>.6H<sub>2</sub>O (red)    (C) FeSO<sub>4</sub>.6H<sub>2</sub>O (green)    (D) MnSO<sub>4</sub> (faint pink)
- 20.\*–** Complexes formed in the cyanide process are :  
 (A) [Au(CN)<sub>2</sub>]<sup>-</sup>                  (B) [Ag(CN)<sub>2</sub>]<sup>-</sup>                  (C) [Cu(CN)<sub>4</sub>]<sup>2-</sup>                  (D) [Zn(CN)<sub>4</sub>]<sup>2-</sup>
- 21.** **Statement-1 :** MgO bricks are used for inner lining of the zone of combustion of blast furnace in extraction of iron.  
**Statement-2 :** MgO fails to react with SiO<sub>2</sub> under the furnace condition where it is used as inner lining.  
 (A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.  
 (B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.  
 (C) Statement-1 is True, Statement-2 is False.                  (D) Statement-1 is False, Statement-2 is True.

22. **Statement-1** : Adding KCN to  $\text{CuSO}_4$  produces a white ppt which dissolves in excess KCN.  
**Statement-2** : With excess KCN,  $\text{CuSO}_4$  forms  $\text{K}_2[\text{Cu}(\text{CN})_4]$  complex.  
 (A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.  
 (B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.  
 (C) Statement-1 is True, Statement-2 is False. (D) Statement-1 is False, Statement-2 is True.
23. **Statement-1** :  $\text{NH}_4\text{Cl}$  is added while analysing the III<sup>rd</sup> group basic radicals to suppress the ionisation of  $\text{NH}_4\text{OH}$ .  
**Statement-2** : With high concentration of  $\text{OH}^-$  ions, basic radicals of other groups also get precipitated with III group cations.  
 (A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.  
 (B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.  
 (C) Statement-1 is True, Statement-2 is False. (D) Statement-1 is False, Statement-2 is True.

### Comprehension # 1

When 16.8 g of white solid (X) was heated 4.4 g of acid gas (A) that turned lime water milky was driven off together with 1.8 g of a gas (B) which condensed to a colorless liquid. The solid that remained (Y) dissolved in water to give an alkaline solution, which with excess of  $\text{BaCl}_2$ , solution gave a white precipitate (Z). The precipitate effloresces with acid giving off  $\text{CO}_2$  gas.

24. Compounds A and B are respectively :  
 (A)  $\text{CO}_2$  and  $\text{H}_2\text{O}$  (B)  $\text{SO}_2$  and  $\text{H}_2\text{O}$  (C)  $\text{CO}_2$  and  $\text{N}_2\text{O}_4$  (D)  $\text{SO}_2$  and  $\text{N}_2\text{O}_4$
25. Compounds X and Y are respectively :  
 (A)  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  and  $\text{Na}_2\text{O}$  (B)  $\text{KHCO}_3$  and  $\text{CO}_2$   
 (C)  $\text{NaHCO}_3$  and  $\text{Na}_2\text{CO}_3$  (D)  $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 1.5\text{H}_2\text{O}$  and  $\text{Na}_2\text{CO}_3$
26. Compound Z is :  
 (A)  $\text{BaSO}_3$  (B)  $\text{BaSO}_4$  (C)  $\text{Ba}(\text{HCO}_3)_2$  (D)  $\text{BaCO}_3$

### Comprehension # 2

A mixture (M) of two salts was treated as follows :

- (i) The mixture was heated with  $\text{MnO}_2$  and concentrated  $\text{H}_2\text{SO}_4$ , when yellowish green gas (P) was liberated.  
 (ii) The mixture on heating with  $\text{NaOH}$  solution gave a gas (Q) that turned red litmus blue.  
 (iii) Its solution in water gave blue precipitate (R) with potassium ferricyanide and red coloration (S) with ammonium thiocyanate.  
 (iv) The mixture was boiled with  $\text{KOH}$  and the liberated gas was bubbled through on alkaline solution of  $\text{K}_2\text{HgI}_4$  to give brown precipitate (T).

27. Gas P and Q are respectively.  
 (A)  $\text{ClO}_2$  and  $\text{NH}_3$  (B)  $\text{SOCl}_2$  and  $\text{SO}_3$  (C)  $\text{NH}_3$  and  $\text{Cl}_2$  (D)  $\text{Cl}_2$  and  $\text{NH}_3$
28. Compounds R and S confirm the presence of :  
 (A)  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$  respectively (B)  $\text{Fe}^{3+}$  and  $\text{Fe}^{2+}$  respectively  
 (C)  $\text{Fe}^{3+}$  ions only (D)  $\text{Fe}^{2+}$  ions only

### Comprehension # 3

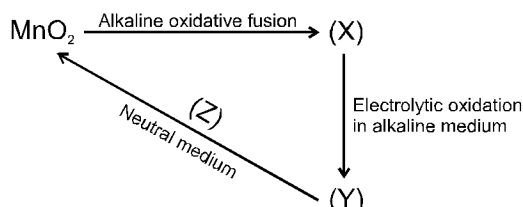
$\text{X} + \text{dil H}_2\text{SO}_4 \longrightarrow$  brown colored vapours turning wet starch iodide paper blue

$\text{X} + \text{NaOH} \xrightarrow{\Delta} \text{NH}_3$  gas

$\text{X} \xrightarrow{\Delta} \text{Y(g)} + \text{Z(g)}$  but liquid at room temperature.

29. Compound X is  
 (A)  $(\text{NH}_4)_2\text{SO}_4$  (B)  $\text{NH}_4\text{NO}_2$  (C)  $(\text{NH}_4)_2\text{CO}_3$  (D) none of these
30. Compound Y and Z are respectively  
 (A)  $\text{N}_2$ ,  $\text{H}_2\text{O}$  (B)  $\text{CO}_2$ ,  $\text{H}_2\text{O}$  (C)  $\text{NO}_2$ ,  $\text{H}_2\text{O}$  (D)  $\text{SO}_2$ ,  $\text{H}_2\text{O}$

### Comprehension # 4



31. What is (Z) ?  
 (A) It is a salt of  $\text{Fe}^{3+}$  (B) It is a salt of  $\text{Sn}^{4+}$  (C) It is a salt of  $\text{Mn}^{2+}$  (D) It is a salt of  $\text{Cr}^{6+}$
32. What happens when X is kept in acidic medium ?  
 (A) neutralisation reaction. (B) disproportionation reaction.  
 (C) double decomposition reaction (D) pyrolytic reaction
33.  $\text{Mn}^{2+} + \text{S}_2\text{O}_8^{2-} + \text{H}_2\text{O} \longrightarrow [\text{X}] + \text{SO}_4^{2-} + \text{H}^+$  The magnetic moment (spin only) of [X] is :
34. Amongst the following the total number of ions which produce colour in the solutions (in water) is.  
 ${}_{22}\text{Ti}^{3+}$ ,  ${}_{23}\text{V}^{4+}$ ,  ${}_{24}\text{Cr}^{3+}$ ,  ${}_{82}\text{Pb}^{2+}$ ,  ${}_{26}\text{Fe}^{2+}$ ,  ${}_{30}\text{Zn}^{2+}$ ,  ${}_{28}\text{Ni}^{2+}$ ,  ${}_{21}\text{Sc}^{3+}$ ,  ${}_{80}\text{Hg}^{2+}$
35. Which of the following will produce an insoluble precipitate with  $\text{NH}_3(\text{aq.})/\text{H}_2\text{S}$ .  
 $\text{BaCl}_2$ ,  $\text{NiSO}_4$ , Mohr's salt,  $\text{AlCl}_3$ ,  $\text{Bi}(\text{NO}_3)_3$ ,  $\text{Hg}(\text{CH}_3\text{COO})_2$ ,  $\text{AgNO}_3$ ,  $\text{SnCl}_2$ ,  $\text{CoSO}_4$ .
36.  $\text{NaCl} + \text{Solid } \text{K}_2\text{Cr}_2\text{O}_7 + \text{Conc. } \text{H}_2\text{SO}_4 \longrightarrow \text{"X"}$  (reddish brown fumes) How many axial-d-orbital are involved in hybridization of "X" ?
37. What is the oxidation number of Cr in the product of the reaction of  $\text{K}_2\text{Cr}_2\text{O}_7$  with  $\text{H}_2\text{O}_2 / \text{H}^+$ , followed by boiling, followed by treatment with excess KOH.
38. How many of the following contain at least one iron atom in +2 oxidation state?  
 (a)  $\text{FeS}_2$  (b) Haematite (c) Magnetite (d) Brown ring complex  
 (e)  $\text{Na}_2[\text{Fe}(\text{CN})_5(\text{NO})]$  (f)  $\text{Fe}[\text{Fe}(\text{CN})_6]$  (g)  $\text{K}_2\text{Fe}[\text{Fe}(\text{CN})_6]$  (h) Ferrocene ( $[\text{Fe}(\text{C}_5\text{H}_5)_2]$ )  
 (i)  $\text{FeWO}_4$
39. Amongst the following, the total number of compounds whose aqueous solution gives white precipitate with  $\text{Pb}^{2+}$  ions is :  $\text{KI}$ ,  $\text{NH}_3$ ,  $\text{Na}_2\text{CO}_3$ ,  $\text{K}_2\text{CrO}_4$ ,  $\text{NaCl}$ ,  $\text{Na}_2\text{SO}_3$ ,  $\text{Na}_2\text{S}$ ,  $\text{KNO}_3$ ,  $\text{NaClO}_4$
40. How many of the following metallurgies involve leaching ?  
 $\text{Al}_2\text{O}_3 \longrightarrow \text{Al}$  ;  $\text{Ag}_2\text{S} \longrightarrow \text{Ag}$  ;  $\text{Au} \longrightarrow \text{Au}$  ;  $\text{CuFeS}_2 \longrightarrow \text{Cu}$  ;  $\text{PbS} \longrightarrow \text{Pb}$   
 $\text{MgCl}_2 \longrightarrow \text{Mg}$  ;  $\text{FeCO}_3 \longrightarrow \text{Fe}$  ; Low grade copper ore  $\longrightarrow \text{Cu}$  ;  $\text{HgS} \longrightarrow \text{Hg}$
41. The number of reducing agents involved in the extraction of iron (as pig iron) using blast furnace from ore haematite is(are).
42. Match the compound in column (I) with the properties of products obtained on heating it in column (II).  
**Column - I** **Column - II**  
 (A)  $\text{FeSO}_4$  (p) One of the product is basic oxide  
 (B)  $\text{NH}_4\text{NO}_3$  (q) One of the product is acidic oxide  
 (C)  $\text{Ba}(\text{N}_3)_2$  (r) One of the product is unreactive towards  $\text{O}_2$  at room temperature.  
 (D)  $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$  (s) At least one of the product is neutral oxide.
43. Match the reactions given in column - I with the nature of the reaction/products given in column - II  
**Column - I** **Column - II**  
 (A)  $\text{S}_2\text{O}_3^{2-}(\text{aq}) + \text{H}^+(\text{aq}) \longrightarrow$  (p) Show disproportionation  
 (B)  $\text{Cu}^{2+}(\text{aq}) + \text{I}^-(\text{aq}) \longrightarrow$  (q) Redox reaction  
 (C)  $\text{CrO}_4^{2-}(\text{aq}) + \text{H}^+(\text{aq}) \longrightarrow$  (r) At least one of the products is diamagnetic  
 (D)  $\text{Mg}(\text{NH}_4)\text{VO}_4 \xrightarrow{\Delta}$  (s) One of the products has metal-oxygen-metal bond/ linkage.
44. In column-I there are certain reactions which are given by different basic radicals with the reagents given in column-II in qualitative analysis. Now match the entries given in column-I with entries given in column-II.  
**Column-I** **Column-II**  
 (A)  $\text{Pb}^{2+}$  ions form yellow precipitate with (p)  $\text{K}_2\text{CrO}_4$  solution  
 (B)  $\text{Zn}^{2+}$  ions form first white precipitate and then dissolves in excess with (q)  $\text{NaOH}$  solution  
 (C)  $\text{Ni}^{2+}$  ions form green precipitate with (r)  $\text{KI}$  solution  
 (D)  $\text{Cu}^{2+}$  ions form blue precipitate with (s)  $\text{NH}_3$  solution  
 (t)  $\text{KCN}$  solution
45. **Column - I** **Column - II**  
 (A) White or buff colored (p)  $\text{Mn}(\text{OH})_2$   
 (B) Oxidisable by air (q)  $\text{Zn}(\text{OH})_2$   
 (C) Amphoteric (r)  $\text{Fe}(\text{OH})_2$   
 (D) Green (s)  $\text{Cr}(\text{OH})_3$   
 (t)  $\text{Ni}(\text{OH})_2$