The d- and f- block Elements

Q.No.1:
Which of the following arrangements does not represent the correct order of the property stated against it ?

JEE 2013

A. $V^{2+} < Cr^{2+} < Mn^{2+} < Fe^{2+}$: paramagnetic behaviour

B. $Ni^{2+} < Co^{2+} < Fe^{2+} < Mn^{2+}$: ionic size

C. $Co^{3+} < Fe^{3+} < Cr^{3+} < Sc^{3+}$: stability in aqueous solution

D. Sc < Ti < Cr < Mn : number of oxidation states

Q.No.2:
Four successive members of the first row transition elements are listed below with atomic numbers. Which one of them is expected to have the highest $E^0_{M^{3+}/M^{2+}}$ value ?

JEE 2013

A. Cr(Z = 24)

B. Mn(Z = 25)

C. Fe(Z = 26)

D. Co(Z = 27)

Q.No.3: The equation which is balanced and represents the correct product(s) is

A. $[Mg(H_2O)_6]^{2+} + (EDTA)^{4-} \xrightarrow{\text{excess NaOH}} [Mg(EDTA)]^{2+} + 6H_2O$

B. $CuSO_4 + 4KCN \rightarrow K_2[Cu(CN)_4] + K_2SO_4$

C. $Li_2O + 2KCl \rightarrow 2LiCl + K_2O$

D. $[CoCl(NH_3)_5]^+ + 5H^+ \rightarrow Co^{2+} + 5NH_4^+ + Cl^-$

Q.No.4: Which series of reactions correctly represents the chemical relations

related to iron and its compounds ?

A. $\mathrm{Fe} \xrightarrow{\mathrm{Cl_2,\ heat}} \mathrm{FeCl_3} \xrightarrow{\mathrm{heat,\ air}} \mathrm{FeCl_2} \xrightarrow{\mathrm{Zn}} \mathrm{Fe}$

B. $\mathrm{Fe} \xrightarrow{\mathrm{O_2,\ heat}} \mathrm{Fe_3O_4} \xrightarrow{\mathrm{CO,\ 600^\circ C}} \mathrm{FeO} \xrightarrow{\mathrm{CO,\ 700^\circ C}} \mathrm{Fe}$

C. $\mathrm{Fe} \xrightarrow{\mathrm{dil\ H_2SO_4}} \mathrm{FeSO_4} \xrightarrow{\mathrm{H_2SO_4,\ O_2}} \mathrm{Fe_2(SO_4)_3} \xrightarrow{\mathrm{heat}} \mathrm{Fe}$

D. $\mathrm{Fe} \xrightarrow{\mathrm{O_2,\ heat}} \mathrm{FeO} \xrightarrow{\mathrm{dil\ H_2SO_4}} \mathrm{FeSO_4} \xrightarrow{\mathrm{heat}} \mathrm{Fe}$

Q.No.5: Match the catalysts to the correct processes:

Catalyst	Process
(A) $TiCl_3$	(i) Wacker process
(B) $PdCl_2$	(ii) Ziegler – Natta polymerization
(C) $CuCl_2$	(iii) Contact process
(D) V_2O_5	(iv) Deacon's process

JEE 2015

A. (A) – (iii), (B) – (ii), (C) – (iv), (D) – (i)
B. (A) – (ii), (B) – (i), (C) – (iv), (D) – (iii)
C. (A) – (ii), (B) – (iii), (C) – (iv), (D) – (i)
D. (A) – (iii), (B) – (i), (C) – (ii), (D) – (iv)

Q.No.6: Which of the following atoms has the highest first ionization energy?

JEE 2016

A. Na
B. K
C. Sc
D. Rb

Q.No.7: The transition element that has lowest enthalpy of atomisation, is:

JEE 2019

A. Fe
B. Cu
C. V
D. Zn

Q.No.8: In the reaction of oxalate with permanganate in acidic medium, the

number of electrons involved in producing one molecule of CO_2 is: **JEE 2019**

A. 1
B. 10
C. 2
D. 5

Q.No.9: The element that usually does NOT show variable oxidation states is: **JEE 2019**

A. Cu
B. Ti
C. Sc
D. V

Q.No.10:

$$\underline{A} \xrightarrow{4\,KOH,\,O_2} \underset{(Green)}{2\,\underline{B}} + 2H_2O$$

$$3\,\underline{B} \xrightarrow{4\ HCl} \underset{(Purple)}{2\,\underline{C}} + MnO_2 + 2H_2O$$

$$2\,\underline{C} \xrightarrow{H_2O,\ Kl} 2\,\underline{A} + 2\,KOH + \underline{D}$$

In the above sequence of reactions, A and D, respectively, are : **JEE 2019**

A. KI and $KMnO_4$
B. MnO_2 and KIO_3
C. KIO_3 and MNO_2
D. KI and K_2MnO_4