Master Math for JEE Main & JEE Advanced

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JEE Mains 2020 Jan Chapter wise Question Bank

s-Block Elements

Q1

In zeolites & synthetic resin method which will be more efficient in removing permanent hardness of water :
(1) Synthetic resin method as it exchange only cation.
(2) Zeolite resin method as it exchange only cation.
(3) Synthetic resin method as it exchange only anion.
(4) Synthetic resin is harmful for nature.

7th Jan Morning

Sol

(1)

Q2

$$NaOH + Cl_2 \xrightarrow[\text{Hot \& conc.}]{} A + \text{other products}$$

$$Ca(OH)_2 + Cl_2 \xrightarrow[\text{Cold \& dil.}]{} B + \text{other products}$$

A & B are respectively
(1) $NaClO_3$, $Ca(OCl)_2$ (2) $NaClO_3$, $Ca(ClO_3)_2$
(3) NaCl, $Ca(ClO_3)_2$ (4) NaClO, $Ca(ClO_3)_2$

$$NaOH + Cl_2 \xrightarrow[\text{गर्म तथा सान्द्र}]{} A + \text{अन्य उत्पाद}$$

$$Ca(OH)_2 + Cl_2 \xrightarrow[\text{ठण्डा तथा तनु}]{} B + \text{अन्य उत्पाद}$$

A तथा B क्रमशः है –
(1) $NaClO_3$, $Ca(OCl)_2$ (2) $NaClO_3$, $Ca(ClO_3)_2$
(3) NaCl, $Ca(ClO_3)_2$ (4) NaClO, $Ca(ClO_3)_2$

7th Jan Evening

Sol

(1)

$$6NaOH + 3Cl_2 \rightarrow 5NaCl + NaClO_3 + 3H_2O$$

$$2Ca(OH)_2 + Cl_2 \rightarrow Ca(OCl)_2 + CaCl_2 + H_2O$$

Q3

Gypsum on heating at 393K produces

(1) dead burnt plaster

(2) Anhydrous $CaSO_4$

(3) $CaSO_4 \cdot \frac{1}{2}H_2O$

(4) $CaSO_4 \cdot 5H_2O$

8th Jan Morning

Sol

(3)

Theory based.

Q4

Given the following reaction sequence

$$A + N_2 \longrightarrow \underset{(B)}{\text{nitride}} \xrightarrow{H_2O} NH_3 \xrightarrow{CuSO_4} \text{Blue Colour}$$

A & B are respectively

निम्न अभिक्रिया अनुक्रम दिया गया है

$$A + N_2 \longrightarrow \underset{(B)}{\text{नाइट्राइड}} \xrightarrow{H_2O} NH_3 \xrightarrow{CuSO_4} \text{नीला रंग}$$

A तथा B क्रमशः है

(1) Mg, Mg_3N_2

(2) Na Na_3N

(3) Mg $Mg(NO_3)_2$

(4) Na $NaNO_3$

8th Jan Evening

Sol

(1)

$$3Mg + N_2 \longrightarrow \underset{(B)}{Mg_3N_2} \xrightarrow{H_2O} Mg(OH)_2 + NH_3$$

Q5

Which of the following oxides are acidic, Basic Amphoteric Respectively.

निम्न में से कौनसे ऑक्साइड क्रमशः अम्लीय, क्षारीय, उभयधर्मी है–

(1) MgO, P_4O_{10}, Al_2O_3 (2) N_2O_3, Li_2O, Al_2O_3 (3) SO_3, Al_2O_3, Na_2O (4) P_4O_{10}, Al_2O_3, MgO

9th Jan Morning

Sol

(2)

Non-metal oxides are acidic in nature

alkali metal oxides are basic in nature

Al_2O_3 is amphoteric.

Q6

Determine degree of hardness in term of ppm of $CaCO_3$ of 10^{-3} molar $MgSO_4$ (aq).

9th Jan Morning

Sol

100.00

10^{-3} molar $MgSO_4 \equiv 10^{-3}$ moles of $MgSO_4$ present in 1 L solutions.

10^{-3} मोलर $MgSO_4 \equiv 1$ L विलयन में उपस्थित $MgSO_4$ के 10^{-3} मोल

$$n_{CaCO_3} \equiv n_{MgSO_4}$$

$$ppm_{(\text{in term of } CaCO_3)} = \frac{10^{-3} \times 100}{1000} \times 10^6$$

$$ppm_{(\text{in term of } CaCO_3)} = 100 \text{ ppm}$$

Q7

Select the correct statements among the followings

(A) LiCl does not dissolve in pyridine

(B) Li does not react ethyne to form ethynide.

(C) Li and Mg react slowly with water.

(D) Among alkali metals Li has highest hydration tendency.

9th Jan Evening

Sol

(1)

Theory based

Q8

Given an element having following ionisation enthalpies $IE_1 = 496 \frac{kJ}{mol}$ and $IE_2 = 4562 \frac{kJ}{mol}$ one mole hydroxide of this element is treated separated with HCl and H_2SO_4 respectively. Moles of HCl and H_2SO_4 reacted respectively is

निम्न आयनन एन्थैल्पी रखने वाला एक तत्व दिया गया है $IE_1 = 496 \frac{kJ}{mol}$ तथा $IE_2 = 4562 \frac{kJ}{mol}$ इस तत्व के एक मोल हाइड्रॉक्साइड को पृथक रूप से क्रमशः HCl तथा H_2SO_4 के साथ उपचारित किया जाता है। अभिकृत HCl तथा H_2SO_4 के मोल क्रमशः है–

(1) 1, 0.5 (2) 0.5, 1 (3) 2, 0.5 (4) 0.5, 2

9th Jan Evening

Sol

(1)

According to the given data of I.E, This element must belong to group 1 and thus is monovalent & form hydroxide of the type M(OH).

$MOH + HCl \longrightarrow MCl + H_2O$

1 mole 1 mole

$2MOH + H_2SO_4 \longrightarrow M_2SO_4 + H_2O$

1 mole 1/2 mole

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