1

14.3gm of hydrated sodium carbonate $Na_2CO_3.XH_2O$ dissolved in water, then the volume of the solution is completed to 1litre , if 25ml of this solution is neutralized by 25ml of 0.1M of hydrochloric acid so,

The percentage of water crystallization will be .....

Given that $(O = 16\ ,\ C = 12\ ,\ Na = 23)$

- **62.93%**
- **31.65%**
- **25.87%**
- **15.73%**

2

A sample of a mixture of sodium chloride and sodium phosphate salts its mass is 10g dissolved in water, then an excess of barium chloride solution is added to it, a precipitate is formed its mass is 6 g so,

The percentage of sodium phosphate in the sample will be .....

Given that (Ba=137 , Na=23 , P=31, O=16)

- **32.7%**
- **16.35%**
- **49.05%**
- **65.5%**

3

You have pairs of the following salts:

1) Sodium nitrite and Sodium carbonate

2) Sodium sulphite and Sodium sulphate

3) Potassium sulphate and Potassium phosphate

4) Potassium iodide and copper sulphate

Which of the previous pairs we can use dilute Hydrochloric acid to distinguish between them separately?

- **(1) and (2)**
- **(2) and (4)**
- **(1) and (3)**
- **(3) and (4)**

4

If you have the following compounds solutions:

1) Aluminum chloride

2) Iron III chloride

3) Iron II chloride

4) Hydrogen chloride

Which of the previous compounds can be used to distinguish between sodium hydroxide solution and ammonium hydroxide solution?

- **(1) , (4)**
- **(2) , (3)**
- **(1) , (2) ,(4)**
- **(1) , (2) , (3)**

5

20 ml of 0.1 Mole/L of sodium hydroxide solution is added to 10 ml of 0.2 Mole/L of sulphoric acid solution

Which of the following choices expresses the type of resultant solution and its effects on the indicator colour?

- **Type of solution** **The effect on indicator colour**

- **acidic** **changes methyl orange into red**

- **Type of solution** **The effect on indicator colour**

- **alkaline** **changes litmus solution into blue**

- **Type of solution** **The effect on indicator colour**

- **neutral** **changes bromothemol blue into green**

- **Type of solution** **The effect on indicator colour**

- **acidic** **changes phenol phthaline into red**

6

(A) and (B) are two solutions of potassium salts , when adding silver nitrate solution to both of them, a yellow preciptate is formed for both of them , then by adding dilute nitric acid to the preciptate of both of them, we found that the preciptate formed from (A) solution dissolves in the acid while the preciptate formed from (B) solution does not dissolve in the acid

The anions of (A) and (B) salts respectively are .....

- **Anion of (A) salt Anion of (B) salt**

  phosphate iodied

- **Anion of (A) salt Anion of (B) salt**

  iodied phosphate

- **Anion of (A) salt Anion of (B) salt**

  chloride bromide

- **Anion of (A) salt Anion of (B) salt**

  bromide chloride

7

Adding 2 moles of red bromine dissolved in carbon tetra chloride to 1mole the following compounds

(2-Butyne , pentane , 2-Hexene) the correct change that happens to the solution colour .....

- **2-Butyne Pentane 2-Hexene**

  the colour disappears unchanged unchanged

- **2-Butyne Pentane 2-Hexene**

  unchanged the colour disappears unchanged

- **2-Butyne Pentane 2-Hexene**

  unchanged unchanged unchanged

- **2-Butyne Pentane 2-Hexene**

  unchanged unchanged the colour disappears

8

One of the following compounds has only three isomers, which is .....

- **pentane**
- **butane**
- **propane**
- **hexane**

9

Dry distillation for sodium pentanoate salt (C_4H_9COONa) in presence of soda lime ..... is produced

- **butane**
- **butene**
- **pentane**
- **pentene**

10

The correct arrangement for the steps of preparing alkane from alkyne is .....

- **catalyic hydration - oxidation - neutralization by NaOH - dry distillation**
- **oxidation - dry distillation - neutralization by NaOH - catalyic hydration**
- **neutralization by NaOH - dry distillation - catalyic hydration - oxidation**
- **dry distillation - neutralization by NaOH - catalyic hydration - oxidation**

11

X , Y and Z are three opened chained hydrocarbons , if

(X) reacts by additions at two stages

(Y) all its bonds are strong sigma bonds

(Z) decolourizes the colour of alkaline potassium permengneate solution

Which of the following choices expresses the compounds (X , Y and Z)?

- **X Y Z**

  alkyne alkane alkene

  X Y Z

  alkene alkane alkyne

- **X Y Z**

  alkane alkene alkyne

- **X Y Z**

  alkene alkyne alkane

-

12

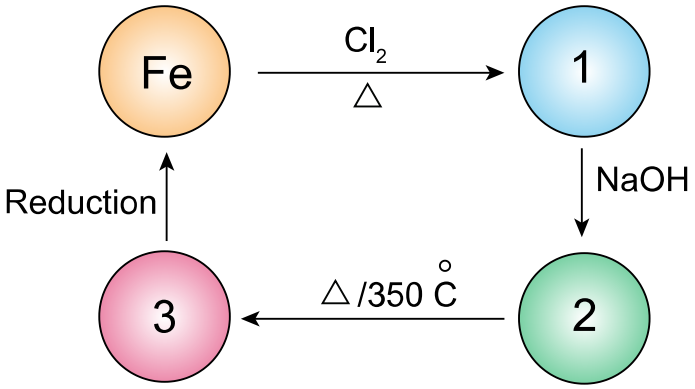
The correct nomencluture for this following compound

[2-Bromo - 5-ethyl - 4-hexene] according to IUPAC system is.....

- **6-bromo - 3-methyl - 3-heptene**
- **2-bromo - 5-methyl - 4-heptene**
- **6-bromo - 2-ethyl - 2-hexene**
- **2-bromo - 5-ethyl - 4-pentene**

13

Study the following diagram:



The three compounds 1 , 2 and 3 are respectively .....

- 1 – $FeCl_3$, 2 – $Fe(OH)_3$, 3 – Fe_2O_3
- 1 – $FeCl_2$, 2 – Fe_2O_3 , 3 – $Fe(OH)_3$
- 1 – $FeCl_3$, 2 – Fe_2O_3 , 3 – $Fe(OH)_3$
- 1 – $FeCl_2$, 2 – FeO , 3 – $Fe(OH)_2$

14

By heating the following iron compounds ($FeCO_3$, Fe_3O_4 ,FeO) separately and comparing the solid mass produced after heating .....

(Fe=56,C=12,O=16)

- **the mass of Fe_3O_4 doesn't change , the mass of FeO increases**
- **the mass of $FeCO_3$ increases and the mass of Fe_3O_4 doesn't change**
- **the mass of $FeCO_3$ increases and mass of FeO decreases**
- **the mass of $FeCO_3$ decreases and the mass of Fe_3O_4 increases**

15

Heating iron II oxalate in air strongly gives a solid compound (X). When concentrated hot sulphuric acid is added to compound (X) another compound (Y) will be formed. In comparing the properties of compounds (X) and (Y) it is found that .....

- **the compounds (X) and (Y) have equal magnetic moment and both of them are coloured**
- **the compound (Y) has higher magnetic moment than (X) and both of them are coloured**
- **the compound (X) has higher magnetic moment than (Y) and one of them is coloured**
- **the compounds (X) and (Y) have equal magnetic moment and both of them are uncoloured**

16

2 chemical compounds (A) and (B) :

On heating the compound (A) a gas produced which is used to reduce iron oxides, and on heating the compound (B) the produced gas changes the color of a paper wetted by potassium dichromate acidified by conc. sulphuric acid from orange to green

Which one of the following correctly represents compounds (A) and (B)?

- **A B**

  iron II oxalate iron II sulphate

  A B

  iron II carbonate iron III chloride

- **A B**

  iron III sulphate iron III oxide

- **A B**

  iron II sulphate iron III hydroxide

-

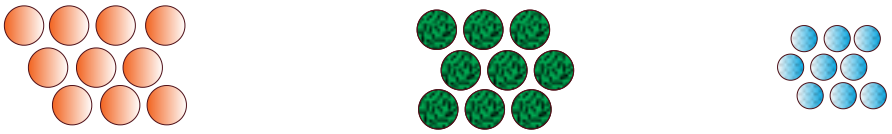
17

X,Y,Z,L represent four transition elements and their oxides are X_2O_5 , Y_2O_3 , ZO_2 and L_2O

The right arrangement for their oxidation number in these oxides is .....

- L < Y < Z < X
- L < Y < X < Z
- Y < L < Z < X
- L < Z < Y < X

18



x y z

In the previous figure (X) , (Y) and (Z) are three different elements are used to form three different types of alloys

alloy (1) produced by mixing molten (X) with molten (Y)

alloy (2) produced by mixing molten (Y) with molten (Z)

alloy (3) produced from reaction of (Y) with (Z)

The types of alloys are .....

- **(1) (2) (3)**

  substitutional interstitial intermetallic

  (1) (2) (3)

  substitutional intermetallic interstitial

- **(1) (2) (3)**

  intermetallic substitutional interstitial

- **(1) (2) (3)**

  interstitial intermetallic substitutional

-

19

Element	A	B	C	D
Reduction potential	-1.66	-2.37	+0.799	-1.26

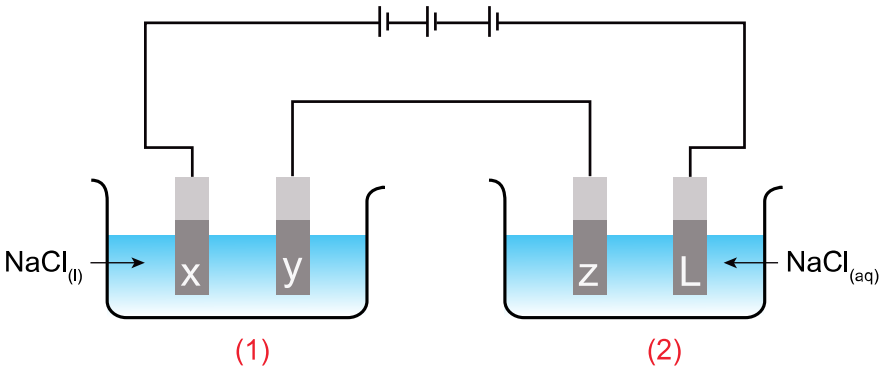
The previous table represents reduction potential for four elements (A,B,C and D)

Which of the previous metals can be used as a scarifying electrode for another element?

- **B for A**
- **A for B**
- **C for D**
- **C forA**

20

In the opposite diagram:



Cell (1) contains molten sodium chloride

Cell (2) contains aqueous solution of sodium chloride

An elecholysis process is made for both of them , the substances formed at the electrodes (X,Y,Z and L) are .....

- **X Y Z L**

  Cl_2 Na Cl_2 H_2

- **X Y Z L**

  Cl_2 Na Na Cl_2

- **X Y Z L**

  H_2 Cl_2 Na Cl_2

- **X Y Z L**

  Cl_2 Na H_2 O_2

21

An electronic cell its electrodes made of chromium and platinum , if the standard reduction potentials as follows:

$Cr^{3+}_{(aq)} + 3e^- \rightarrow Cr_{(s)} \qquad E^o = -0.727\ V$

$Pt^{2+}_{(aq)} + 2e^- \rightarrow Pt_{(s)} \qquad E^o = +1.2\ V$

The diagram which represents this cell is:

- $2Cr_{(s)} / 2Cr^{3+}_{(aq)} \ // \ 3Pt^{2+}_{(aq)} / 3Pt^0_{(s)}$
- $Cr_{(s)} / Cr^{3+}_{(aq)} \ // \ Pt^{2+}_{(aq)} / Pt_{(s)}$
- $3Pt^{2+}_{(aq)} / 3Pt^0 \ // \ 2Cr^{3+}_{(aq)} / 2Cr^0_{(s)}$
- $Pt^{2+}_{(aq)} / Pt^0_{(s)} \ // \ 2Cr^{0}_{(s)} / 2Cr^{3+}_{(aq)}$

22

In plating a metallic object by using a pure gold rode immersed in a solution of gold III chloride $AuCl_3$ which of the following represents what occurs to mass of anode and the reaction at cathode .....

- **Mass of anode Reaction at cathode**

  Decreases $2Au^{3+} + 6e^- \rightarrow 2Au^0$

- **Mass of anode Reaction at cathode**

  Increases $2Au^0 \rightarrow 2Au^{3+} + 6e^-$

- **Mass of anode Reaction at cathode**

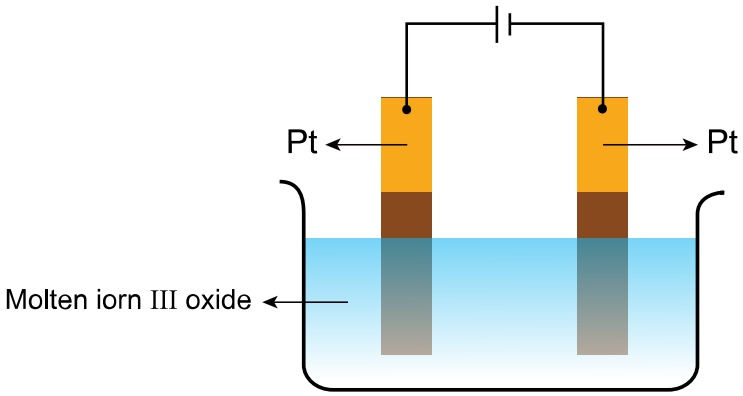
  Decreases $6Cl^- \rightarrow 3Cl_2 + 6e^-$

- **Mass of anode Reaction at cathode**

  Does not change $3Cl_2 + 6e^- \rightarrow 6Cl^-$

23

The opposite figure represents an analytical cell for molten iron III oxide



When10 ampers passed for two hours through the molten iron III oxide , the volume of evolved gas at anode at (S.T.P) is .....

- **4.17 liter**
- **8.34 liter**
- **16.68 liter**
- **12.51 liter**

24

Element	A	B	C	D
Standard oxidation potential (volt)	+2.711	0.28	-1.2	-2.87

The previous table represents the standard oxidation potential of four elements A,B,C&D

the galvanic cell produces the highest e.m.f is .....

- **(A) as an anode , (D) as a cathode**
- **(D) as an anode , (A) as a cathode**
- **(D) as an anode , (C) as a cathode**
- **(B) as an anode , (D) as a cathode**

25

The following equation represents a system at equilibrium state

$$AgCl_{(s)} \rightleftharpoons Ag^{+}_{(aq)} + Cl^{-}_{(aq)}$$

which of the following changes takes place by adding drops of lead acetate to that system .....

- **the rate of forward reaction increases and concentration of chloride ion decreases**
- **the rate of backward reaction increases and concentration of silver ions increases**
- **the rate of forward reaction decreases and concentration of chloride ion increases**
- **the rate of backward reaction decreases and concentration of silver ions decreases**

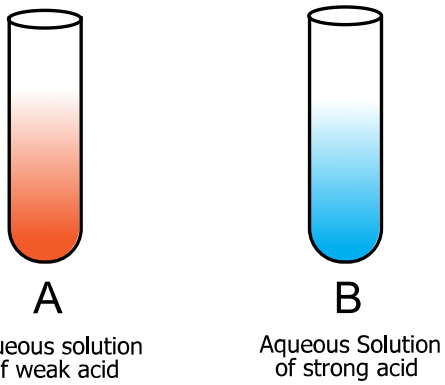
26

Which of the following statements describes chemical reaction at equilibrium state .....

- **concentration of reactants and products are always constant**
- **concentration of reactants and products are always equal**
- **rate of forward reaction is always higher than that backward reaction**
- **the reaction is always static not dynamic**

27

In the opposite figure:



Which of the following represents the change occurs in the ionization degree (α)

after adding equal amount of water to each tube?

- **Tube (A) Tube (B)**
  increases does not affect
- **Tube (A) Tube (B)**
  decreases increases
- **Tube (A) Tube (B)**
  does not affect decreases
- **Tube (A) Tube (B)**
  increases decreases

28

If the pH value of an aqueous solution is 3.7, so the concentration of hydroxide ion [OH^-] for that solution is ..... M

- 5.01×10^{-11}
- 1.99×10^{-4}
- **10.3**
- **7.3**

29

During preparation of ammonia gas from its elements at a certain temperature, it is found that $K_c=3.7\times10^{-4}$, $[H_2]=0.7M$, $[N_2]=0.5M$

So $[NH_3]$ = ... M

- 7.96×10^{-3}
- 63.36×10^{-6}
- 3.9×10^{-2}
- 7.8×10^{-4}

30

The aqueous solution of potassium acetate is distinguished from the aqueous solution of ammonium acetate which has the same volume and concentration by .....

- **$[H_3O^+]$ value in case of potassium acetate solution is lower**
- **pH value in case of potassium acetate is lower**
- **$[OH^-]$ value in case of potassium acetate is lower**
- **pOH value of ammonium acetate is lower**